

## Appendix Group 5

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### I. DYNAMIC ANALYSIS CODE FOR RIGHT ROBOT ARM

```
%This is the part that derived the Transformation matrix of the robot arm
syms L1 L2 L3 L4 L5 L6 L7 th1 th2 th3 th4 th5 th6 th7 D1 D2 D3 D4 D5 D6 D7
alphaa=[0,90,0,0,-90,90,0]; % this is the alpha value for links
a=[0,0,0.24365,0.21325,0,0,0]; % Length of the Link
d=[0.15190, 0, 0.11985,-0.093,0.08325,0.083,0.25006]; %Offset
th=[th1,th2,th3,th4,th5,th6,th7]; % joint angle variation
%%Transformation Matrices
for i=1:7
    switch i
        case 1
            T01= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
        case 2
            T12= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
        case 3
            T23= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
        case 4
            T34= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
        case 5
            T45= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
        case 6
            T56= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
        case 7
            T6E= [cos(th(1,i)), -
sin(th(1,i))*cosd(alphaa(1,i)), sind(alphaa(1,i))*sin(th(1,i)), a(1,i)*cos(th(1,i)); sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)), -
sind(alphaa(1,i))*cos(th(1,i)), sin(th(1,i))*a(1,i); 0, sind(alphaa(1,i)), cosd(alphaa(1,i)), d(1,i)
);0,0,0,1];
    end
end

T0E = T01*T12*T23*T34*T45*T56*T6E;
T0E = simplify(T0E);
A_matrix=T0E;
% J = jacobian([cos(th1 + th2)*(D3 + D4 + D5) - D6*sin(th1 + th2)*sin(th3 + th4 + th5) +
D7*sin(th6)*[-sin(th1 + th2)*cos(th3 + th4 + th5)) + cos(th1 + th2)*cos(th6)] - a4*sin(th1 +
th2)*cos(th3 + th4) - a3*sin(th1 + th2)*cos(th3)], [cos(th1 + th2)*(D3 + D4 + D5) - D6*sin(th1
+ th2)*sin(th3 + th4 + th5) + D7*sin(th6)*sin(th3 + th4 + th5) + D7*sin(th6)*[-sin(th1 +
th2)*cos(th3 + th4 + th5) + cos(th1 + th2)*cos(th6)] - a4*sin(th1 + th2)*cos(th3 + th4) -
a3*sin(th1 + th2)* cos(th3)], [D6*cos(th1 + th2)*cos(th3 + th4 + th5) - D7*cos(th1 +
th2)*sin(th3 + th4 + th5)*sin(th6) - a4*cos(th1 + th2)*sin(th3 + th4) - a3*cos(th1 +
th2)*sin(th3)], [D6*cos(th1 + th2)*cos(th3 + th4 + th5) - D7*cos(th1 + th2)*sin(th3 + th4 +
th5)*sin(th6) - a4*cos(th1 + th2)*sin(th3 + th4)], [D6*cos(th1 + th2)*cos(th3 + th4) -
D7*cos(th1 + th2)*sin(th3 + th4 + th5)*sin(th6)], [D7*sin(th1 + th2)*(cos(th6)*cos(th6) -
sin(th6)*sin(th6)) + D7*cos(th6)*cos(th1 + th2)*sin(th3 + th4 + th5)], [sin(th1 + th2)*(D3 +
D4 + D5) - D6*cos(th1 + th2)*sin(th3 + th4 + th5) + D7*(sin(th1 + th2)*cos(th6) + cos(th1 +
th2)*cos(th3 + th4 + th5)*sin(th6)) + a4*cos(th1 + th2)*cos(th3 + th4) + a3*cos(th1 +
th2)*cos(th3)], [sin(th1 + th2)*(D3 + D4 + D5) - D6*cos(th1 + th2)*sin(th3 + th4 + th5) +
D7*[sin(th1 + th2)*cos(th6) + cos(th1 + th2)*cos(th3 + th4 + th5)*sin(th6)] + a4*cos(th1 +
th2)*cos(th3 + th4) + a3*cos(th1 + th2)*cos(th3)], [-D6*sin(th1 + th2)*cos(th3 + th4 + th5) -
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D7*sin(th1 + th2)*sin(th3 + th4 + th5)*sin(th6) - a4*sin(th1 + th2)*sin(th3 + th4) -
a3*sin(th1 + th2)*sin(th3)], [-D6*sin(th1 + th2)*cos(th3 + th4 + th5) - D7*sin(th1 +
th2)*sin(th3 + th4 + th5)*sin(th6) - a4*sin(th1 + th2)*sin(th3 + th4)], [-D6*sin(th1 +
th2)*cos(th3 + th4 + th5) - D7*sin(th1 + th2)*sin(th3 + th4 + th5)*sin(th6)], [D7*(cos(th1 +
th2)*sin(th6) + sin(th1 + th2)*cos(th3 + th4 + th5)*cos(th6))], 0, 0, [-D6*sin(th3 + th4 +
th5) + D7*cos(th3 + th4 + th5)*sin(th6) + a4*cos(th3 + th4) + a3*cos(th3)], [-D6*sin(th3 + th4
+ th5) + D7*cos(th3 + th4 + th5)*sin(th6) + a4*cos(th3 + th4)], [-D6*sin(th3 + th4 + th5) +
D7*cos(th3 + th4 + th5)*sin(th6)], [D7*sin(th3 + th4 + th5)*cos(th6)], [th1; th2; th3; th4;
th5; th6]]

%%
%This is the part for stating all links' specification and also creating 02,03&04 T matrices

syms th1 th2 th3 th4 th5 th6 d1 d2 d3 d4 d5 d6 d7;
d1=0.15190; d2=0; d3=0.11985; d4=-0.093; d5=0.08325; d6=0.083; d7=0.25006; %arm architecture
(m)
th_matrix=[th1 th2 th3 th4 th5 th6];

T02=T01*T12;
T03=T02*T23;
T04=T03*T34;
T05=T04*T45;
T06=T05*T56;
T07=T06*T6E;

%links specs
%mass in kg of each link
m1=4.02; m2=1.399; m3=2.5; m4=2.5; m5=1; m6=1; m7=0.09984;

%Position of the center of mass in the DH framework, units in m
r1=[0; 0; 36.25e-3; 0];
r2=[10.91e-03; 0; 6.22e-3; 0];
r3=[131.9e-3; 0; 5.21e-3; 0];
r4=[106.25e-3; 0; 5.43e-3; 0];
r5=[0; 3.92e-3; -41.09e-3; 0];
r6=[4.58e-3; 0; 8.65e-3; 0];
r7=[-63.07e-3; 0; 0; 0];

%%
%This calculate the Uij and Uijk matrices

%Uij Matrixes
U11=diff(T01,th1); U21=diff(T02,th1); U31=diff(T03,th1);
U12=zeros(6); U22=diff(T02,th2); U32=diff(T03,th2);
U13=zeros(6); U23=zeros(6); U33=diff(T03,th3);
U14=zeros(6); U24=zeros(6); U34=zeros(6);
U15=zeros(6); U25=zeros(6); U35=zeros(6);
U16=zeros(6); U26=zeros(6); U36=zeros(6);

U41=diff(T04,th1); U51=diff(T05,th1); U61=diff(T06,th1);
U42=diff(T04,th2); U52=diff(T05,th2); U62=diff(T06,th2);
U43=diff(T04,th3); U53=diff(T05,th3); U63=diff(T06,th3);
U44=diff(T04,th4); U54=diff(T05,th4); U64=diff(T06,th4);
U45=zeros(6); U55=diff(T05,th5); U65=diff(T06,th5);
U46=zeros(6); U56=zeros(6); U66=diff(T06,th6);

%Uijk Matrixes

%U1jk Matrixes
U111=diff(U11,th1); U121=zeros(6); U131=zeros(6);
U112=zeros(6); U122=zeros(6); U132=zeros(6);
U113=zeros(6); U123=zeros(6); U133=zeros(6);
U114=zeros(6); U124=zeros(6); U134=zeros(6);
U115=zeros(6); U125=zeros(6); U135=zeros(6);
U116=zeros(6); U126=zeros(6); U136=zeros(6);

U141=zeros(6); U151=zeros(6); U161=zeros(6);
U142=zeros(6); U152=zeros(6); U162=zeros(6);
U143=zeros(6); U153=zeros(6); U163=zeros(6);
U144=zeros(6); U154=zeros(6); U164=zeros(6);
U145=zeros(6); U155=zeros(6); U165=zeros(6);
U146=zeros(6); U156=zeros(6); U166=zeros(6);

%U2jk Matrixes
U211=diff(U21,th1); U221=diff(U22,th1); U231=zeros(6);
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```
U212=diff(U21,th2); U222=diff(U22,th2); U232=zeros(6);
U213=zeros(6); U223=zeros(6); U233=zeros(6);
U214=zeros(6); U224=zeros(6); U234=zeros(6);
U215=zeros(6); U225=zeros(6); U235=zeros(6);
U216=zeros(6); U226=zeros(6); U236=zeros(6);
```

```
U241=zeros(6); U251=zeros(6); U261=zeros(6);
U242=zeros(6); U252=zeros(6); U262=zeros(6);
U243=zeros(6); U253=zeros(6); U263=zeros(6);
U244=zeros(6); U254=zeros(6); U264=zeros(6);
U245=zeros(6); U255=zeros(6); U265=zeros(6);
U246=zeros(6); U256=zeros(6); U266=zeros(6);
```

### %U3jk Matrixes

```
U311=diff(U31,th1); U321=diff(U32,th1); U331=diff(U33,th1);
U312=diff(U31,th2); U322=diff(U32,th2); U332=diff(U33,th2);
U313=diff(U31,th3); U323=diff(U32,th3); U333=diff(U33,th3);
U314=zeros(6); U324=zeros(6); U334=zeros(6);
U315=zeros(6); U325=zeros(6); U335=zeros(6);
U316=zeros(6); U326=zeros(6); U336=zeros(6);
```

```
U341=zeros(6); U351=zeros(6); U361=zeros(6);
U342=zeros(6); U352=zeros(6); U362=zeros(6);
U343=zeros(6); U353=zeros(6); U363=zeros(6);
U344=zeros(6); U354=zeros(6); U364=zeros(6);
U345=zeros(6); U355=zeros(6); U365=zeros(6);
U346=zeros(6); U356=zeros(6); U366=zeros(6);
```

### %U4jk Matrixes

```
U411=diff(U41,th1); U421=diff(U42,th1); U431=diff(U43,th1);
U412=diff(U41,th2); U422=diff(U42,th2); U432=diff(U43,th2);
U413=diff(U41,th3); U423=diff(U42,th3); U433=diff(U43,th3);
U414=diff(U41,th4); U424=diff(U42,th4); U434=diff(U43,th4);
U415=zeros(6); U425=zeros(6); U435=zeros(6);
U416=zeros(6); U426=zeros(6); U436=zeros(6);
```

```
U441=diff(U44,th1); U451=zeros(6); U461=zeros(6);
U442=diff(U44,th2); U452=zeros(6); U462=zeros(6);
U443=diff(U44,th3); U453=zeros(6); U463=zeros(6);
U444=diff(U44,th4); U454=zeros(6); U464=zeros(6);
U445=zeros(6); U455=zeros(6); U465=zeros(6);
U446=zeros(6); U456=zeros(6); U466=zeros(6);
```

### %U5jk Matrixes

```
U511=diff(U51,th1); U521=diff(U52,th1); U531=diff(U53,th1);
U512=diff(U51,th2); U522=diff(U52,th2); U532=diff(U53,th2);
U513=diff(U51,th3); U523=diff(U52,th3); U533=diff(U53,th3);
U514=diff(U51,th4); U524=diff(U52,th4); U534=diff(U53,th4);
U515=diff(U51,th5); U525=diff(U52,th5); U535=diff(U53,th5);
U516=zeros(6); U526=zeros(6); U536=zeros(6);
```

```
U541=diff(U54,th1); U551=diff(U55,th1); U561=zeros(6);
U542=diff(U54,th2); U552=diff(U55,th2); U562=zeros(6);
U543=diff(U54,th3); U553=diff(U55,th3); U563=zeros(6);
U544=diff(U54,th4); U554=diff(U55,th4); U564=zeros(6);
U545=diff(U54,th5); U555=diff(U55,th5); U565=zeros(6);
U546=zeros(6); U556=zeros(6); U566=zeros(6);
```

### %U6jk Matrixes

```
U611=diff(U61,th1); U621=diff(U62,th1); U631=diff(U63,th1);
U612=diff(U61,th2); U622=diff(U62,th2); U632=diff(U63,th2);
U613=diff(U61,th3); U623=diff(U62,th3); U633=diff(U63,th3);
U614=diff(U61,th4); U624=diff(U62,th4); U634=diff(U63,th4);
U615=diff(U61,th5); U625=diff(U62,th5); U635=diff(U63,th5);
U616=diff(U61,th6); U626=diff(U62,th6); U636=diff(U63,th6);
```

```
U641=diff(U64,th1); U651=diff(U65,th1); U661=diff(U66,th1);
U642=diff(U64,th2); U652=diff(U65,th2); U662=diff(U66,th2);
U643=diff(U64,th3); U653=diff(U65,th3); U663=diff(U66,th3);
U644=diff(U64,th4); U654=diff(U65,th4); U664=diff(U66,th4);
U645=diff(U64,th5); U655=diff(U65,th5); U665=diff(U66,th5);
U646=diff(U64,th6); U656=diff(U65,th6); U666=diff(U66,th6);
```

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```

%%
%Stating I and calculate inertial J
%I matrixes

I1=[10.2921e-3      -2.36e-9      -14.35e-9;
    -2.36e-9      10.2921e-3      -11.91e-9;
    -14.35e-9     -11.91e-9      5.3716e-3];

I2=[1.3791e-3      0.34e-9      -5.0677e-5;
    0.34e-9      2.2137e-3      0.49e-9;
    -5.0677e-5    0.49e-9      2.0081e-3];

I3=[26.8253e-3     -0.01e-9      3.0074e-3;
    -0.01e-9      70.329e-3      2.62e-9;
    3.0074e-3     2.62e-9      69.5364e-3];

I4=[2.0312e-3      -11.63e-9      2.3815e-3;
    -11.63e-9      47.4942e-3      0.07e-9;
    0.07e-9      47.0847e-3      47.0847e-3];

I5=[2.5784e-3      0.29e-9      0.47e-9;
    0.29e-9      2.5278e-3      -2.0021e-4;
    -2.0021e-4    6.9373e-4      6.9373e-4];

I6=[9.9189e-4      0.71e-9      -2.2094e-5;
    0.71e-9      1.0778e-3      -0.36e-9;
    -0.36e-9      6.3909e-4      6.3909e-4];

I7=[5.0501e-5      0      0;
    0      4.3024e-4      0;
    0      4.3024e-4      4.3024e-4];

%J matrix

I=zeros(6);
for i=1:7
    I=eval(['I' num2str(i)]);
    m=eval(['m' num2str(i)]);
    r=eval(['r' num2str(i)]);
    eval(['j11' '=( (-I(1,1)+I(2,2)+I(3,3))/2)']);
    eval(['j12' '=I(1,2)']);
    eval(['j13' '=I(1,3)']);
    eval(['j14' '=m*r(1)']);

    eval(['j21' '=I(1,2)']);
    eval(['j22' '=((I(1,1)-I(2,2)+I(3,3))/2)']);
    eval(['j23' '=I(2,3)']);
    eval(['j24' '=m*r(2)']);

    eval(['j31' '=I(1,3)']);
    eval(['j32' '=I(2,3)']);
    eval(['j33' '=((I(1,1)+I(2,2)-I(3,3))/2)']);
    eval(['j34' '=m*r(3)']);

    eval(['j41' '=m*r(1)']);
    eval(['j42' '=m*r(2)']);
    eval(['j43' '=m*r(3)']);
    eval(['j44' '=m']);

    J=[j11 j12 j13 j14; j21 j22 j23 j24; j31 j32 j33 j34; j41 j42 j43 j44];
    eval(['J' num2str(i) '=J']);
end

%%
%Finding all the D terms from U and J before and create D matrix (angular acceleration-
inertia term)

%D matrix
Uaux=zeros(6);
for i=1:6
    for j=1:6
        m=max([i j]);
        x=1;
        for k=m:6
            Uaux=eval(['U' num2str(k) num2str(i)]);
            Ud=Uaux';
            A=eval(['U' num2str(k) num2str(j)])*eval(['J' num2str(k)])*Ud;

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        x=x+trace(A);
    end
    eval(['d' num2str(i) num2str(j) '=x']);
end
end

D=[d11 d12 d13 d14 d15 d16
   d21 d22 d23 d24 d25 d26
   d31 d32 d33 d34 d35 d36
   d41 d42 d43 d44 d45 d46
   d51 d52 d53 d54 d55 d56
   d61 d62 d63 d64 d65 d66];

%actuator inertia term and Coriolis are calculated as H matrix

for i=1:6
    for k=1:6
        for m=1:6
            j=max([i m k]);
            x=0;
            for l=j:6
                Uaux=eval(['U' num2str(j) num2str(i)]);
                Uh=Uaux';
                x=x+trace(eval(['U' num2str(j) num2str(k) num2str(m)])*eval(['J' num2str(j)])*Uh);
            end
            eval(['h' num2str(i) num2str(k) num2str(m) '=x']);
        end
    end
end

%Coriolis column matrix
syms dth1 dth2 dth3 dth4 dth5 dth6

for i=1:6
    y=0;
    for k=1:6
        for m=1:6
            y=y+eval(['h' num2str(i) num2str(k) num2str(m)])*eval(['dth'
num2str(k)])*eval(['dth' num2str(m)]);
        end
    end
    eval(['h' num2str(i) '=y']);
end

H=[h1;h2;h3;h4;h5;h6];

%Gravity column matrix as C

g=[0 0 -9.81 0];

for i=1:6
    x=0;
    for j=i:6
        x=x+(-eval(['m' num2str(j)])*g*eval(['U' num2str(j) num2str(i)])*eval(['r'
num2str(j)]));
    end
    eval(['c' num2str(i) '=x']);
end

C=[c1;c2;c3;c4;c5;c6];

%%
%Final dynamic model, T with following terms:
% -1st part is angular acceleration-inertia term D*ddth
% -2nd part is Coriolis and Centrifugal term H
% -3rd part is gravity terms C

syms ddth1 ddth2 ddth3 ddth4 ddth5 ddth6
ddth=[ddth1;ddth2;ddth3;ddth4;ddth5;ddth6];
%T=[t1;t2;t3;t4;t5;t6;t7]; %Matrix with torques of each joint

T=vpa(D*ddth+H+C);
T = simplify(T);

```

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### II. DYNAMIC ANALYSIS CODE FOR LEFT ROBOT ARM

```
%This is the part that derived the Transformation matrix of the robot arm
syms L1 L2 L3 L4 L5 L6 L7 th1 th2 th3 th4 th5 th6 th7 D1 D2 D3 D4 D5 D6 D7
alphaa=[0,90,0,0,-90,90,0]; % this is the alpha value for links
a=[0,0,0.24365,0.21325,0,0,0]; % Length of the Link
d=[0.15190, 0, 0.11985,-0.093,0.08325,0.083,0.19413]; %Offset
th=[th1,th2,th3,th4,th5,th6,th7]; % joint angle variation
%%Transformation Matrices
for i=1:7
    switch i
        case 1
            T01= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
        case 2
            T12= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
        case 3
            T23= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
        case 4
            T34= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
        case 5
            T45= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
        case 6
            T56= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
        case 7
            T6E= [cos(th(1,i)),-
sin(th(1,i))*cosd(alphaa(1,i)),sind(alphaa(1,i))*sin(th(1,i)),a(1,i)*cos(th(1,i));sin(th(1,i))
,cos(th(1,i)).*cosd(alphaa(1,i)),-
sind(alphaa(1,i))*cos(th(1,i)),sin(th(1,i))*a(1,i);0,sind(alphaa(1,i)),cosd(alphaa(1,i)),d(1,i
);0,0,0,1];
    end
end

T0E = T01*T12*T23*T34*T45*T56*T6E;
T0E = simplify(T0E);
A_matrix=T0E;
% J = jacobian([cos(th1 + th2)*(D3 + D4 + D5) - D6*sin(th1 + th2)*sin(th3 + th4 + th5) +
D7*sin(th6)*[(-sin(th1 + th2)*cos(th3 + th4 + th5)) + cos(th1 + th2)*cos(th6)] - a4*sin(th1 +
th2)*cos(th3 + th4) - a3*sin(th1 + th2)*cos(th3)], [cos(th1 + th2)*(D3 + D4 + D5) - D6*sin(th1
+ th2)*sin(th3 + th4 + th5) + D7*sin(th6)*sin(th3 + th4 + th5) + D7*sin(th6)*[-sin(th1 +
th2)*cos(th3 + th4 + th5) + cos(th1 + th2)*cos(th6)] - a4*sin(th1 + th2)*cos(th3 + th4) -
a3*sin(th1 + th2)*cos(th3)], [D6*cos(th1 + th2)*cos(th3 + th4 + th5) - D7*cos(th1 +
th2)*sin(th3 + th4 + th5)*sin(th6) - a4*cos(th1 + th2)*sin(th3 + th4) - a3*cos(th1 +
th2)*sin(th3)], [D6*cos(th1 + th2)*cos(th3 + th4 + th5) - D7*cos(th1 + th2)*sin(th3 + th4 +
th5)*sin(th6) - a4*cos(th1 + th2)*sin(th3 + th4)], [D6*cos(th1 + th2)*cos(th3 + th4 + th5) -
D7*cos(th1 + th2)*sin(th3 + th4 + th5)*sin(th6)], [D7*sin(th1 + th2)*(cos(th6)*cos(th6) -
sin(th6)*sin(th6)) + D7*cos(th6)*cos(th1 + th2)*sin(th3 + th4 + th5)], [sin(th1 + th2)*(D3 +
D4 + D5) - D6*cos(th1 + th2)*sin(th3 + th4 + th5) + D7*(sin(th1 + th2)*cos(th6) + cos(th1 +
th2)*cos(th3 + th4 + th5)*sin(th6)) + a4*cos(th1 + th2)*cos(th3 + th4) + a3*cos(th1 +
th2)*cos(th3)], [sin(th1 + th2)*(D3 + D4 + D5) - D6*cos(th1 + th2)*sin(th3 + th4 + th5) +
D7*[sin(th1 + th2)*cos(th6) + cos(th1 + th2)*cos(th3 + th4 + th5)*sin(th6)] + a4*cos(th1 +
th2)*cos(th3 + th4) + a3*cos(th1 + th2)*cos(th3)], [-D6*sin(th1 + th2)*cos(th3 + th4 + th5) -
```

## Appendix Group 5

```
D7*sin(th1 + th2)*sin(th3 + th4 + th5)*sin(th6) - a4*sin(th1 + th2)*sin(th3 + th4) -
a3*sin(th1 + th2)*sin(th3)], [-D6*sin(th1 + th2)*cos(th3 + th4 + th5) - D7*sin(th1 +
th2)*sin(th3 + th4 + th5)*sin(th6) - a4*sin(th1 + th2)*sin(th3 + th4)], [-D6*sin(th1 +
th2)*cos(th3 + th4 + th5) - D7*sin(th1 + th2)*sin(th3 + th4 + th5)*sin(th6)], [D7*(cos(th1 +
th2)*sin(th6) + sin(th1 + th2)*cos(th3 + th4 + th5)*cos(th6))], 0, 0, [-D6*sin(th3 + th4 +
th5) + D7*cos(th3 + th4 + th5)*sin(th6) + a4*cos(th3 + th4) + a3*cos(th3)], [-D6*sin(th3 + th4
+ th5) + D7*cos(th3 + th4 + th5)*sin(th6) + a4*cos(th3 + th4)], [-D6*sin(th3 + th4 + th5) +
D7*cos(th3 + th4 + th5)*sin(th6)], [D7*sin(th3 + th4 + th5)*cos(th6)], [th1; th2; th3; th4;
th5; th6]]

%%
%This is the part for stating all links' specification and also creating 02,03&04 T matrices

syms th1 th2 th3 th4 th5 th6 d1 d2 d3 d4 d5 d6 d7;
d1=0.15190; d2=0; d3=0.11985; d4=-0.093; d5=0.08325; d6=0.083; d7=0.19413; %arm architecture
(m)
th_matrix=[th1 th2 th3 th4 th5 th6];

T02=T01*T12;
T03=T02*T23;
T04=T03*T34;
T05=T04*T45;
T06=T05*T56;
T07=T06*T6E;

%links specs
%mass in kg of each link
m1=4.02; m2=1.399; m3=2.5; m4=2.5; m5=1; m6=1; m7=0.09984;

%Position of the center of mass in the DH framework, units in m
r1=[0; 0; 36.25e-3; 0];
r2=[10.91e-03; 0; 6.22e-3; 0];
r3=[131.9e-3; 0; 5.21e-3; 0];
r4=[106.25e-3; 0; 5.43e-3; 0];
r5=[0; 3.92e-3; -41.09e-3; 0];
r6=[4.58e-3; 0; 8.65e-3; 0];
r7=[-63.07e-3; 0; 0; 0];

%%
%This calculate the Uij and Uijk matrices

%Uij Matrixes
U11=diff(T01,th1); U21=diff(T02,th1); U31=diff(T03,th1);
U12=zeros(6); U22=diff(T02,th2); U32=diff(T03,th2);
U13=zeros(6); U23=zeros(6); U33=diff(T03,th3);
U14=zeros(6); U24=zeros(6); U34=zeros(6);
U15=zeros(6); U25=zeros(6); U35=zeros(6);
U16=zeros(6); U26=zeros(6); U36=zeros(6);

U41=diff(T04,th1); U51=diff(T05,th1); U61=diff(T06,th1);
U42=diff(T04,th2); U52=diff(T05,th2); U62=diff(T06,th2);
U43=diff(T04,th3); U53=diff(T05,th3); U63=diff(T06,th3);
U44=diff(T04,th4); U54=diff(T05,th4); U64=diff(T06,th4);
U45=zeros(6); U55=diff(T05,th5); U65=diff(T06,th5);
U46=zeros(6); U56=zeros(6); U66=diff(T06,th6);

%Uijk Matrixes

%U1jk Matrixes
U111=diff(U11,th1); U121=zeros(6); U131=zeros(6);
U112=zeros(6); U122=zeros(6); U132=zeros(6);
U113=zeros(6); U123=zeros(6); U133=zeros(6);
U114=zeros(6); U124=zeros(6); U134=zeros(6);
U115=zeros(6); U125=zeros(6); U135=zeros(6);
U116=zeros(6); U126=zeros(6); U136=zeros(6);

U141=zeros(6); U151=zeros(6); U161=zeros(6);
U142=zeros(6); U152=zeros(6); U162=zeros(6);
U143=zeros(6); U153=zeros(6); U163=zeros(6);
U144=zeros(6); U154=zeros(6); U164=zeros(6);
U145=zeros(6); U155=zeros(6); U165=zeros(6);
U146=zeros(6); U156=zeros(6); U166=zeros(6);

%U2jk Matrixes
U211=diff(U21,th1); U221=diff(U22,th1); U231=zeros(6);
```



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```
U212=diff(U21,th2); U222=diff(U22,th2); U232=zeros(6);
U213=zeros(6); U223=zeros(6); U233=zeros(6);
U214=zeros(6); U224=zeros(6); U234=zeros(6);
U215=zeros(6); U225=zeros(6); U235=zeros(6);
U216=zeros(6); U226=zeros(6); U236=zeros(6);
```

```
U241=zeros(6); U251=zeros(6); U261=zeros(6);
U242=zeros(6); U252=zeros(6); U262=zeros(6);
U243=zeros(6); U253=zeros(6); U263=zeros(6);
U244=zeros(6); U254=zeros(6); U264=zeros(6);
U245=zeros(6); U255=zeros(6); U265=zeros(6);
U246=zeros(6); U256=zeros(6); U266=zeros(6);
```

### %U3jk Matrixes

```
U311=diff(U31,th1); U321=diff(U32,th1); U331=diff(U33,th1);
U312=diff(U31,th2); U322=diff(U32,th2); U332=diff(U33,th2);
U313=diff(U31,th3); U323=diff(U32,th3); U333=diff(U33,th3);
U314=zeros(6); U324=zeros(6); U334=zeros(6);
U315=zeros(6); U325=zeros(6); U335=zeros(6);
U316=zeros(6); U326=zeros(6); U336=zeros(6);
```

```
U341=zeros(6); U351=zeros(6); U361=zeros(6);
U342=zeros(6); U352=zeros(6); U362=zeros(6);
U343=zeros(6); U353=zeros(6); U363=zeros(6);
U344=zeros(6); U354=zeros(6); U364=zeros(6);
U345=zeros(6); U355=zeros(6); U365=zeros(6);
U346=zeros(6); U356=zeros(6); U366=zeros(6);
```

### %U4jk Matrixes

```
U411=diff(U41,th1); U421=diff(U42,th1); U431=diff(U43,th1);
U412=diff(U41,th2); U422=diff(U42,th2); U432=diff(U43,th2);
U413=diff(U41,th3); U423=diff(U42,th3); U433=diff(U43,th3);
U414=diff(U41,th4); U424=diff(U42,th4); U434=diff(U43,th4);
U415=zeros(6); U425=zeros(6); U435=zeros(6);
U416=zeros(6); U426=zeros(6); U436=zeros(6);
```

```
U441=diff(U44,th1); U451=zeros(6); U461=zeros(6);
U442=diff(U44,th2); U452=zeros(6); U462=zeros(6);
U443=diff(U44,th3); U453=zeros(6); U463=zeros(6);
U444=diff(U44,th4); U454=zeros(6); U464=zeros(6);
U445=zeros(6); U455=zeros(6); U465=zeros(6);
U446=zeros(6); U456=zeros(6); U466=zeros(6);
```

### %U5jk Matrixes

```
U511=diff(U51,th1); U521=diff(U52,th1); U531=diff(U53,th1);
U512=diff(U51,th2); U522=diff(U52,th2); U532=diff(U53,th2);
U513=diff(U51,th3); U523=diff(U52,th3); U533=diff(U53,th3);
U514=diff(U51,th4); U524=diff(U52,th4); U534=diff(U53,th4);
U515=diff(U51,th5); U525=diff(U52,th5); U535=diff(U53,th5);
U516=zeros(6); U526=zeros(6); U536=zeros(6);
```

```
U541=diff(U54,th1); U551=diff(U55,th1); U561=zeros(6);
U542=diff(U54,th2); U552=diff(U55,th2); U562=zeros(6);
U543=diff(U54,th3); U553=diff(U55,th3); U563=zeros(6);
U544=diff(U54,th4); U554=diff(U55,th4); U564=zeros(6);
U545=diff(U54,th5); U555=diff(U55,th5); U565=zeros(6);
U546=zeros(6); U556=zeros(6); U566=zeros(6);
```

### %U6jk Matrixes

```
U611=diff(U61,th1); U621=diff(U62,th1); U631=diff(U63,th1);
U612=diff(U61,th2); U622=diff(U62,th2); U632=diff(U63,th2);
U613=diff(U61,th3); U623=diff(U62,th3); U633=diff(U63,th3);
U614=diff(U61,th4); U624=diff(U62,th4); U634=diff(U63,th4);
U615=diff(U61,th5); U625=diff(U62,th5); U635=diff(U63,th5);
U616=diff(U61,th6); U626=diff(U62,th6); U636=diff(U63,th6);
```

```
U641=diff(U64,th1); U651=diff(U65,th1); U661=diff(U66,th1);
U642=diff(U64,th2); U652=diff(U65,th2); U662=diff(U66,th2);
U643=diff(U64,th3); U653=diff(U65,th3); U663=diff(U66,th3);
U644=diff(U64,th4); U654=diff(U65,th4); U664=diff(U66,th4);
U645=diff(U64,th5); U655=diff(U65,th5); U665=diff(U66,th5);
U646=diff(U64,th6); U656=diff(U65,th6); U666=diff(U66,th6);
```

## Appendix Group 5

```

%%
%Stating I and calculate inertial J
%I matrixes

I1=[10.2921e-3      -2.36e-9      -14.35e-9;
    -2.36e-9      10.2921e-3      -11.91e-9;
    -14.35e-9     -11.91e-9      5.3716e-3];

I2=[1.3791e-3      0.34e-9      -5.0677e-5;
    0.34e-9      2.2137e-3      0.49e-9;
    -5.0677e-5    0.49e-9      2.0081e-3];

I3=[26.8253e-3     -0.01e-9      3.0074e-3;
    -0.01e-9      70.329e-3      2.62e-9;
    3.0074e-3     2.62e-9      69.5364e-3];

I4=[2.0312e-3      -11.63e-9      2.3815e-3;
    -11.63e-9      47.4942e-3      0.07e-9;
    0.07e-9      47.0847e-3      47.0847e-3];

I5=[2.5784e-3      0.29e-9      0.47e-9;
    0.29e-9      2.5278e-3      -2.0021e-4;
    -2.0021e-4    6.9373e-4      6.9373e-4];

I6=[9.9189e-4      0.71e-9      -2.2094e-5;
    0.71e-9      1.0778e-3      -0.36e-9;
    -0.36e-9      6.3909e-4      6.3909e-4];

I7=[5.0501e-5      0      0;
    0      4.3024e-4      0;
    0      4.3024e-4      4.3024e-4];

%J matrix

I=zeros(6);
for i=1:7
    I=eval(['I' num2str(i)]);
    m=eval(['m' num2str(i)]);
    r=eval(['r' num2str(i)]);
    eval(['j11' '=( (-I(1,1)+I(2,2)+I(3,3))/2)']);
    eval(['j12' '=I(1,2)']);
    eval(['j13' '=I(1,3)']);
    eval(['j14' '=m*r(1)']);

    eval(['j21' '=I(1,2)']);
    eval(['j22' '=((I(1,1)-I(2,2)+I(3,3))/2)']);
    eval(['j23' '=I(2,3)']);
    eval(['j24' '=m*r(2)']);

    eval(['j31' '=I(1,3)']);
    eval(['j32' '=I(2,3)']);
    eval(['j33' '=((I(1,1)+I(2,2)-I(3,3))/2)']);
    eval(['j34' '=m*r(3)']);

    eval(['j41' '=m*r(1)']);
    eval(['j42' '=m*r(2)']);
    eval(['j43' '=m*r(3)']);
    eval(['j44' '=m']);

    J=[j11 j12 j13 j14; j21 j22 j23 j24; j31 j32 j33 j34; j41 j42 j43 j44];
    eval(['J' num2str(i) '=J']);
end

%%
%Finding all the D terms from U and J before and create D matrix (angular acceleration-
inertia term)

%D matrix
Uaux=zeros(6);
for i=1:6
    for j=1:6
        m=max([i j]);
        x=1;
        for k=m:6
            Uaux=eval(['U' num2str(k) num2str(i)]);
            Ud=Uaux';
            A=eval(['U' num2str(k) num2str(j)])*eval(['J' num2str(k)])*Ud;

```

## Appendix Group 5

```

        x=x+trace(A);
    end
    eval(['d' num2str(i) num2str(j) '=x']);
end
end

D=[d11 d12 d13 d14 d15 d16
   d21 d22 d23 d24 d25 d26
   d31 d32 d33 d34 d35 d36
   d41 d42 d43 d44 d45 d46
   d51 d52 d53 d54 d55 d56
   d61 d62 d63 d64 d65 d66];

%actuator inertia term and Coriolis are calculated as H matrix

for i=1:6
    for k=1:6
        for m=1:6
            j=max([i m k]);
            x=0;
            for l=j:6
                Uaux=eval(['U' num2str(j) num2str(i)]);
                Uh=Uaux';
                x=x+trace(eval(['U' num2str(j) num2str(k) num2str(m)])*eval(['J' num2str(j)])*Uh);
            end
            eval(['h' num2str(i) num2str(k) num2str(m) '=x']);
        end
    end
end

%Coriolis column matrix
syms dth1 dth2 dth3 dth4 dth5 dth6

for i=1:6
    y=0;
    for k=1:6
        for m=1:6
            y=y+eval(['h' num2str(i) num2str(k) num2str(m)])*eval(['dth'
num2str(k)])*eval(['dth' num2str(m)]);
        end
    end
    eval(['h' num2str(i) '=y']);
end

H=[h1;h2;h3;h4;h5;h6];

%Gravity column matrix as C

g=[0 0 -9.81 0];

for i=1:6
    x=0;
    for j=i:6
        x=x+(-eval(['m' num2str(j)])*g*eval(['U' num2str(j) num2str(i)])*eval(['r'
num2str(j)]));
    end
    eval(['c' num2str(i) '=x']);
end

C=[c1;c2;c3;c4;c5;c6];

%%
%Final dynamic model, T with following terms:
% -1st part is angular acceleration-inertia term D*ddth
% -2nd part is Coriolis and Centrifugal term H
% -3rd part is gravity terms C

syms ddth1 ddth2 ddth3 ddth4 ddth5 ddth6
ddth=[ddth1;ddth2;ddth3;ddth4;ddth5;ddth6];
%T=[t1;t2;t3;t4;t5;t6;t7]; %Matrix with torques of each joint

T=vpa(D*ddth+H+C);
T = simplify(T);

```

## Appendix Group 5

### III. DYNAMIC ANALYSIS RESULT FOR RIGHT ROBOT ARM

	T	T(1, 1)	T(2, 1)	T(3, 1)	T(4, 1)	T(5, 1)	T(6, 1)
6x1 sym							
1	1x1 sym						
2	1x1 sym						
3	1x1 sym						
4	1x1 sym						
5	1x1 sym						
6	1x1 sym						

Fig. 1: T Variables Calculated of Dynamic Equation of Right Robot Arm in Matlab

T1=

```

ddth1*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.00000000035999999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.0000000007100000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007100000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0007923500000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.0007923500000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -

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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(conj(th1))*(0.002685799999999999062028077645436*cos(th1) -
0.00000000236000000000000001221691374637696*sin(th1)) +
cos(conj(th1))*(0.002685799999999999062028077645436*cos(th1) +
0.00000000236000000000000001221691374637696*sin(th1)) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.00000000070000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
+
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*sin(conj(th1))*(0.00000000236000000000000001221691374637696*cos(th1) -
0.0026857999999999999062028077645436*sin(th1)) +
sin(conj(th1))*(0.00000000236000000000000001221691374637696*cos(th1) +
0.0026857999999999999062028077645436*sin(th1)) - 1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th1)*sin(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999907322051351244*cos(th1)*sin(th2) +
0.004323798999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
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## Appendix Group 5

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os(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000594270000000000177655667954468299*cos(th1)*cos(th2) -
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000059427000000000177655667954468299*sin(th1)*sin(th2) +
0.000000000289999999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.000022093999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.004323798999999999907322051351244*cos(th1)*cos(th2) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.004323798999999999907322051351244*sin(th1)*sin(th2) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
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## Appendix Group 5

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0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0015848387499999985192733475969362*cos(th1)*cos(th2) -
0.0015848387499999985192733475969362*sin(th1)*sin(th2) -
0.00330754875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0015848387499999985192733475969362*cos(th1)*sin(th2) +
0.0015848387499999985192733475969362*cos(th2)*sin(th1) -
0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.00000000289999999999999998083853395786991*cos(th2)*sin(th1) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000059427000000000177655667954468299*cos(th1)*sin(th2) +
0.000059427000000000177655667954468299*cos(th2)*sin(th1) +
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.042527937499999999917060788945378*cos(th1)*sin(th2) +
0.042527937499999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.00000002620000000000000515083869247245*cos(th2)*sin(th1) +
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## Appendix Group 5

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0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.04252793749999999917060788945378*sin(th1)*sin(th2) -
0.04252793749999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.000000002620000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000026200000000000000515083869247245*sin(th1)*sin(th2) +
0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
ddth5*(1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3))*cos(th4)*(cos(th1))*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00458*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*sin(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2))) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(
cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
```

## Appendix Group 5

[illegible]

[illegible]

## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0) + ddth2*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000700000000000000003842723519198948*cos(th1)*sin
(th2) + 0.000000000700000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000220939999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000220939999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00050677000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.00050677000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.00050677000000000002859906755858788*cos(th1)*sin(th2) +
0.00050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) +
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## Appendix Group 5

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(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000594270000000000177655667954468299*cos(th1)*cos(th2) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000594270000000000177655667954468299*sin(th1)*sin(th2) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
```

## Appendix Group 5

```
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
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[illegible]

## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*sin(th1)*sin(th2) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.0000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00059427000000000177655667954468299*cos(th1)*sin(th2) +
0.00059427000000000177655667954468299*cos(th2)*sin(th1) +
0.0002002100000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0002002100000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.006180941249999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.009513531249999999363842206889785*sin(th1)*sin(th2) -
0.009513531249999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.04252793749999999917060788945378*cos(th1)*sin(th2) +
0.04252793749999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000262000000000000000515083869247245*cos(th2)*sin(th1) +
0.01301634999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04252793749999999917060788945378*sin(th1)*sin(th2) -
0.04252793749999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000002620000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000262000000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.01301634999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) -
1.0*dth2^2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.00005067700000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.00005067700000000002859906755858788*cos(th1)*sin(th2) +
0.00005067700000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.00005067700000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.00005067700000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00005067700000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.00005067700000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2))) -
1.0*dth3^2*(4.0*(0.006180941249999999170607889453777*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th
2) + cos(th2)*sin(th1)) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.7555*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)) - 3.7555*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)) + 4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + dth5^2*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000002899999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000002899999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
dth4^2*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0000000000700000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000000700000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000000700000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
dth1^2*(6.0*cos(conj(th1))*(0.000000023600000000000001221691374637696*cos(th1) -
0.0026857999999999999062028077645436*sin(th1)) -
6.0*cos(conj(th1))*(0.000000023600000000000001221691374637696*cos(th1) +
0.0026857999999999999062028077645436*sin(th1)) +
6.0*sin(conj(th1))*(0.0026857999999999999062028077645436*cos(th1) -
0.000000023600000000000001221691374637696*sin(th1)) +
6.0*sin(conj(th1))*(0.0026857999999999999062028077645436*cos(th1) +
0.000000023600000000000001221691374637696*sin(th1))) -
ddth6*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
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## Appendix Group 5

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+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00022093999999999998866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - 1.0) +
1.0*ddth3*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -

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## Appendix Group 5

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cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000262000000000000000515083869247245*cos(th3)*(cos(th1)*
sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000070000000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.000000000070000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)))+(cos(conj(th1))*sin(conj(th2)))+  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) +  
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -  
0.1101*sin(conj(th1))*sin(conj(th2)) -  
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) +  
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(t  
h2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))  
- sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +  
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +  
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2)))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000071000000000000002974426921534571*cos(th6)*(co  
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +  
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -  
0.000000000359999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si  
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +  
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.00000000359999999999999760595454820992*sin(th6)*(cos(th  
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -  
0.000000007100000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co  
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +  
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.0002765900000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -  
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +  
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)  
) + cos(conj(th2))*sin(conj(th1))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))  
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1)))
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000004700000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th4)*cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))*(0.000955108*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))*(0.00330754875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000070000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000070000000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.938875*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)) + 0.938875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)) + 1.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0) +
1.0*ddth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000007000000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0002209399999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
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## Appendix Group 5

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n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000359999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*s
in(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000470000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000470000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000470000000000000313402995165391*sin(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000470000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
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## Appendix Group 5

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1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 1.0) +
dth6^2*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 1.0*sin(th1)*sin(th2))
- cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000359999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000359999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*dth3*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
```

## Appendix Group 5

```
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
2.0*dth4*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

```
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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## Appendix Group 5

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sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*dth5*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) + +
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## Appendix Group 5

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0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*dth1*dth2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.00005067700000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th1)*sin(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) -
0.000792350000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.00005067700000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.00005067700000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2))) -
2.0*dth1*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000028999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000289999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*dth2*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000289999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000289999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
```



## Appendix Group 5

```
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth3*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
```

[illegible]

## Appendix Group 5

```
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth4*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000289999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000289999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000289999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00220623499999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth1*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) + 2.0*dth2*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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4.0*cos(conj(th3))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000000700000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.005276368749999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.005276368749999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000700000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.005276368749999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.005276368749999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000007000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 2.0*dth3*dth4*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000700000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

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0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
2.0*dth1*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000071000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000359999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000359999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
cos(conj(th2))*sin(conj(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
```

```
0.000022093999999999999999797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000359999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000007100000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000007100000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dt*h2*dt*h6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000007100000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000007100000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
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## Appendix Group 5

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+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))))*(0.0007152999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007152999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))))

```

**T2=**

$$\begin{aligned} & \text{ddth5} * (1.0 * (\cos(\text{conj}(\text{th6})) * (1.0 * \sin(\text{conj}(\text{th5})) * (\cos(\text{conj}(\text{th3})) * \sin(\text{conj}(\text{th4})) * (\cos(\text{conj}(\text{th1})) * \\ & \cos(\text{conj}(\text{th2})) - 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2})))) + \\ & \cos(\text{conj}(\text{th4})) * \sin(\text{conj}(\text{th3})) * (\cos(\text{conj}(\text{th1})) * \cos(\text{conj}(\text{th2})) - \\ & 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2})))) - \\ & \cos(\text{conj}(\text{th5})) * (\cos(\text{conj}(\text{th3})) * \cos(\text{conj}(\text{th4})) * (\cos(\text{conj}(\text{th1})) * \cos(\text{conj}(\text{th2})) - \\ & 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2}))) - \\ & 1.0 * \sin(\text{conj}(\text{th3})) * \sin(\text{conj}(\text{th4})) * (\cos(\text{conj}(\text{th1})) * \cos(\text{conj}(\text{th2})) - \end{aligned}$$

[illegible]

## Appendix Group 5

```
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + (0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
```

## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
```

```
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +  
0.1101*cos(conj(th2))*sin(conj(th1)) -  
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) +  
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) - (0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)  
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +  
0.1101*cos(conj(th2))*sin(conj(th1)) +  
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) +  
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003215650000000021871615629720509*cos(th5)*(cos(th3)  
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1))) -  
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) -  
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)  
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)  
- 1.0*sin(th1)*sin(th2))) -  
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)  
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.0003215650000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
1.0) + ddt_h1*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin  
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)  
- 1.0*sin(th1)*sin(th2)) -  
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) +  
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)  
*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
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## Appendix Group 5

```
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000000003842723519198948*cos(th1)*sin
(th2) + 0.0000000007000000000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2))) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th2))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th1)*sin(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999907322051351244*cos(th1)*sin(th2) +
0.00432379899999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000059427000000000177655667954468299*cos(th1)*cos(th2) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000059427000000000177655667954468299*sin(th1)*sin(th2) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002002100000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999999866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999999866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000276590000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003801407100000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000007000000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.0000000000700000000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0015848387499999985192733475969362*cos(th1)*cos(th2) -
0.0015848387499999985192733475969362*sin(th1)*sin(th2) -
0.00330754875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000007000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0015848387499999985192733475969362*cos(th1)*sin(th2) +
0.0015848387499999985192733475969362*cos(th2)*sin(th1) -
0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000007000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000002899999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000002899999999999999998083853395786991*cos(th1)*sin
(th2) + 0.0000000002899999999999999998083853395786991*cos(th2)*sin(th1) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000059427000000000177655667954468299*cos(th1)*sin(th2) +
0.000059427000000000177655667954468299*cos(th2)*sin(th1) +
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000000002859906755858788*cos(th1)*cos(th2) +
0.001421350000000000000439426273146637*cos(th1)*sin(th2) +
0.001421350000000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*cos(th4)*sin(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.04252793749999999917060788945378*cos(th1)*sin(th2) +
0.04252793749999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000026200000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000026200000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04252793749999999917060788945378*sin(th1)*sin(th2) -
0.04252793749999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000026200000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
ddth2*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0002765900000000000064255453289617*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000064255453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.00000000070000000000000003842723519198948*cos(th2)*sin(th1) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000594270000000000177655667954468299*cos(th1)*cos(th2) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000594270000000000177655667954468299*sin(th1)*sin(th2) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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## Appendix Group 5

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0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0002765900000000000064255453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0002765900000000000064255453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000026200000000000000515083869247245*cos(th1)*sin(th2) -
0.00000000262000000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.042527937499999999917060788945378*sin(th1)*sin(th2) -
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th1)*cos(th2) -
0.00000000262000000000000000515083869247245*sin(th1)*sin(th2) +
0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) -
1.0*dth1^2*(5.0*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th1)*sin(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0000506770000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2))) -
1.0*dth2^2*(5.0*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th1)*sin(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0000506770000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2))) -
1.0*dth3^2*(4.0*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th
2) + cos(th2)*sin(th1)) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.7555*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)) - 3.7555*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) + 4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1))) - 4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + dth5^2*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
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## Appendix Group 5

```
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
dth4^2*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000007000000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000700000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.000000000070000000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.000000000070000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) + 0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - ddth6*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.0007152999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.0007152999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 0.00002209399999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) + 1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th2))*sin(conj(th1))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.00002209399999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00022093999999999998866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))+
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - 1.0) +
1.0*ddth3*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

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0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3))*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3))*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000028999999999999999998083853395786991*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3))*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999999998083853395786991*sin(th5)*(cos(th3))*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000955108*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000028999999999999999998083853395786991*cos(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00330754875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000070000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000070000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.938875*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) + 0.938875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) + 1.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0) +
1.0*ddth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000007000000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

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cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007152999999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000007000000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0002765900000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000028999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*s
in(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 1.0) +
dth6^2*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
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## Appendix Group 5

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th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999999866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999999866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000035999999999999999760595454820992*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999999866797093488579*cos(th6)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
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## Appendix Group 5

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) * cos(th2) - 1.0 * sin(th1) * sin(th2)) + cos(th4) * sin(th3) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2))) + cos(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2)) - cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) +  
0.0000000003599999999999999760595454820992 * cos(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) +  
0.000000000071000000000000002974426921534571 * sin(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)))  
+ 1.0 * (0.00458 * cos(th6) * (1.0 * sin(th5) * (cos(th3) * sin(th4) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2)) + cos(th4) * sin(th3) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) +  
cos(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)) -  
cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) +  
0.00865 * sin(th6) * (1.0 * sin(th5) * (cos(th3) * sin(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2))  
+ cos(th4) * sin(th3) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) +  
cos(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)) -  
cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) -  
0.00865 * cos(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) + 0.00458 * sin(th6) * (cos(th1) * sin(th2)  
+  
cos(th2) * sin(th1))) * (0.083 * cos(conj(th5)) * (cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(c  
onj(th2)) + cos(conj(th2)) * sin(conj(th1)))) +  
cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * sin(conj(th2)) + cos(conj(th2)) * sin(conj(th1))))  
+ 0.083 * sin(conj(th5)) * (cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) -  
1.0 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) - 0.24365 * cos(conj(th3)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) + 0.1101 * cos(conj(th1)) * cos(conj(th2)) -  
0.1101 * sin(conj(th1)) * sin(conj(th2)) -  
0.21325 * cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) +  
0.21325 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) - 1.0 * (sin(conj(th6)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2)))) -  
cos(conj(th6)) * (1.0 * sin(conj(th5)) * (cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)  
)) + cos(conj(th2)) * sin(conj(th1)))) +  
cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * sin(conj(th2)) + cos(conj(th2)) * sin(conj(th1))))  
- cos(conj(th5)) * (cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) -  
1.0 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +  
cos(conj(th2)) * sin(conj(th1)))) * (0.0003625 * cos(th6) * (1.0 * sin(th5) * (cos(th3) * sin(th4) * (cos(th  
1) * cos(th2) - 1.0 * sin(th1) * sin(th2)) + cos(th4) * sin(th3) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2))) + cos(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2)) - cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) -  
0.0000220939999999999998866797093488579 * sin(th6) * (1.0 * sin(th5) * (cos(th3) * sin(th4) * (cos(th1) * cos  
(th2) - 1.0 * sin(th1) * sin(th2)) + cos(th4) * sin(th3) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2))) + cos(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -  
1.0 * sin(th1) * sin(th2)) - cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)))) +  
0.0000220939999999999998866797093488579 * cos(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) +  
0.0003625 * sin(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) +  
1.0 * (0.00865 * cos(th6) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)) -  
0.00458 * sin(th6) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)) +  
0.00458 * cos(th6) * (1.0 * sin(th5) * (cos(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) +  
cos(th4) * sin(th3) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)))) -  
cos(th5) * (cos(th3) * cos(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) -  
1.0 * sin(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)))) +  
0.00865 * sin(th6) * (1.0 * sin(th5) * (cos(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) +  
cos(th4) * sin(th3) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)))) -  
cos(th5) * (cos(th3) * cos(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) -  
1.0 * sin(th3) * sin(th4) * (cos(th1) * sin(th2) +  
cos(th2) * sin(th1)))) * (0.24365 * cos(conj(th3)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2))) -  
0.083 * cos(conj(th5)) * (cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2))) +  
cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2)))) + 0.1101 * cos(conj(th1)) * sin(conj(th2)) +  
0.1101 * cos(conj(th2)) * sin(conj(th1)) -  
0.083 * sin(conj(th5)) * (cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2))) -  
1.0 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2)))) +  
0.21325 * cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2))) -  
0.21325 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -  
1.0 * sin(conj(th1)) * sin(conj(th2)))) -  
2.0 * dth3 * dth6 * (1.0 * (0.000715299999999999987689291991443952 * cos(th6) * (cos(th5) * (cos(th3) * sin(th4
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## Appendix Group 5

[illegible]

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sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - sin(th5)*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) - 0.1101*sin(conj(th1))*sin(conj(th2)) - 0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + 0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +

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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1)))) -
2.0*dth4*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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[illegible]

## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*dth5*dth6*(1.0*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
```

[illegible]

## Appendix Group 5

```
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*dth1*dth2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th1)*sin(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) -
0.000792350000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0000506770000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2))) -
2.0*dth1*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*dth2*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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## Appendix Group 5

```
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth3*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000289999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000289999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000289999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*dth4*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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- 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth1*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) + 2.0*dth2*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1))) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000000700000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000700000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000000070000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000001163000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
2.0*dth1*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999999866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000035999999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth2*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000000359999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
```

## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999999866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.0007152999999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0007152999999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999999987689291991443952*cos(th6)*(1.0*sin(
th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007152999999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
```

## Appendix Group 5

```
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))))
```

**T3=**

```
ddth5*(1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000289999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

[illegible]

## Appendix Group 5

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1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00002209399999999998866797093488579*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
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## Appendix Group 5

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*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0) + ddth1*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + (0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + (0.000000000700000000000000003842723519198948*cos(th1)*sin
(th2) + 0.000000000700000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + (0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000000239404545*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00005067700000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0007923500000000004212463711184*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th1)*sin(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) -
0.0007923500000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00432379899999999999907322051351244*cos(th1)*sin(th2) +
0.00432379899999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000059427000000000177655667954468299*cos(th1)*cos(th2) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000059427000000000177655667954468299*sin(th1)*sin(th2) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000071000000000000002974426921534571*cos(th6)*(1.
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## Appendix Group 5

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0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0002765900000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000007000000000000003842723519198948*cos(th1)*cos(th2
) - 0.0000000007000000000000003842723519198948*sin(th1)*sin(th2) +
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + (cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.0015848387499999985192733475969362*cos(th1)*cos(th2) -
0.0015848387499999985192733475969362*sin(th1)*sin(th2) -
0.00330754875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0000000000700000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000000070000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.005276368749999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0015848387499999985192733475969362*cos(th1)*sin(th2) +
0.0015848387499999985192733475969362*cos(th2)*sin(th1) -
0.005276368749999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000070000000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000070000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.009513531249999999363842206889785*cos(th1)*sin(th2) +
0.009513531249999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.00000000028999999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000028999999999999999998083853395786991*cos(th1)*sin
(th2) + 0.00000000028999999999999999998083853395786991*cos(th2)*sin(th1) +
0.000000000470000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
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## Appendix Group 5

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0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0000594270000000000177655667954468299*cos(th1)*sin(th2) +
0.0000594270000000000177655667954468299*cos(th2)*sin(th1) +
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000289999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000289999999999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.006180941249999999917060788945377*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.04252793749999999917060788945378*cos(th1)*sin(th2) +
0.04252793749999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.00000002620000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04252793749999999917060788945378*sin(th1)*sin(th2) -
0.04252793749999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000002620000000000000515083869247245*cos(th1)*cos(th2) -
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## Appendix Group 5

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0.0000000026200000000000000515083869247245*sin(th1)*sin(th2) +
0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
ddth2*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.00000000035999999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000710000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.00005067700000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.00005067700000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.00000002620000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000007000000000000003842723519198948*cos(th1)*sin
(th2) + 0.0000000007000000000000003842723519198948*cos(th2)*sin(th1) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0008108499999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0008108499999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0002209399999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0002209399999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00050677000000000002859906755858788*cos(th1)*sin(th2) -
0.001421350000000000439426273146637*cos(th1)*cos(th2) +
0.0005067700000000002859906755858788*cos(th2)*sin(th1) +
0.001421350000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0007923500000000004212463711184*cos(th1)*cos(th2) +
0.0005067700000000002859906755858788*cos(th1)*sin(th2) +
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## Appendix Group 5

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0.00005067700000000000002859906755858788*cos(th2)*sin(th1) -
0.000792350000000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000059427000000000177655667954468299*cos(th1)*cos(th2) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000059427000000000177655667954468299*sin(th1)*sin(th2) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000035999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000276590000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00002209399999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000007000000000000003842723519198948*cos(th1)*cos(th2
) - 0.0000000007000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th4))*sin(conj(th2)))*(0.0015848387499999985192733475969362*cos(th1)*cos(th2) -
0.0015848387499999985192733475969362*sin(th1)*sin(th2) -
0.00330754875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0000000007000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000007000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.005276368749999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0015848387499999985192733475969362*cos(th1)*sin(th2) +
0.0015848387499999985192733475969362*cos(th2)*sin(th1) -
0.005276368749999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000007000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000007000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.00000000289999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000470000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.0000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000059427000000000177655667954468299*cos(th1)*sin(th2) +
0.000059427000000000177655667954468299*cos(th2)*sin(th1) +
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th2))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.042527937499999999917060788945378*cos(th1)*sin(th2) +
0.042527937499999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000026200000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000026200000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.042527937499999999917060788945378*sin(th1)*sin(th2) -
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000026200000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) -
1.0*dth1^2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th1)*sin(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2))) -
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[illegible]



## Appendix Group 5

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0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
dth4^2*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0000000007000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000070000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000070000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
```

## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - ddth6*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000359999999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00002209399999999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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## Appendix Group 5

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cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - 1.0) +
1.0*ddth3*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00000000262000000000000000515083869247245*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
```

## Appendix Group 5

```
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0000000000700000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.000000000070000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
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[illegible]

## Appendix Group 5

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1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00027659000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000004700000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000004700000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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## Appendix Group 5

```
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.102918381250000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.102918381250000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00002209399999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1))) -
0.0000000004700000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000955108*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00330754875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000007000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000007000000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.938875*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)) + 0.938875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)) + 1.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0) +
1.0*ddth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000000700000000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000000700000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00002209399999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000000700000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000000700000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0002209399999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000007100000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*s
in(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003215650000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 1.0) +
dth6^2*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000035999999999999999760595454820992*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*dth3*dth6*(1.0*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4
)*cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.000000000359999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*dth4*dth6*(1.0*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
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## Appendix Group 5

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cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*dth5*dth6*(1.0*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4
))*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002209399999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))+ 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(0.00022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*dth1*dth2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th1)*sin(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2))) -
2.0*dth1*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000289999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000289999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
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0.0000000004700000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*dth2*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*sin(conj(th1))*sin(conj(th2)))) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
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## Appendix Group 5

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2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dh4*dh5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +

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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth1*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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## Appendix Group 5

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3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) + 2.0*dth2*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
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## Appendix Group 5

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+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000000007000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000000700000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000000700000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000700000000000003842723519198948*cos(th3)*cos(
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## Appendix Group 5

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th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000000070000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 2.0*dth3*dth4*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000070000000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
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## Appendix Group 5

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s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000070000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000070000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
2.0*dth1*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0007152999999999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000035999999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000000359999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth2*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000000710000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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[illegible]

## Appendix Group 5

```
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
```

## Appendix Group 5

**T4=**

```
2.60578125*cos(th3)*cos(th4) + 0.4030929*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 2.60578125*sin(th3)*sin(th4) +
ddth5*((0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(
conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 1.0*(0.083*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.083*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.04109*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.04109*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

[illegible]





[illegible]

## Appendix Group 5

```
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0) + ddth4*((cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
+ 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))*(0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
```



## Appendix Group 5

```
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000007100000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000035999999999760595454820992*sin(th6)*(co
s(th2)*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0087624425*cos(th3)*cos(th4) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.79875*cos(th3)*cos(th4) - 0.79875*sin(th3)*sin(th4))
- (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
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## Appendix Group 5

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0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
dth1^2*(3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.000000000700000000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.00951353124999999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.000000000700000000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
dth2^2*(3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.000000000700000000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
1.0*ddth1*((0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0002765900000000000064255453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2)) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000064255453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th1)*cos
(th2) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) - 0.0000000002899999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000002899999999999999998083853395786991*cos(th1)*sin(th2)
) + 0.0000000002899999999999999998083853395786991*cos(th2)*sin(th1) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00432379899999999999907322051351244*cos(th1)*sin(th2) +
0.00432379899999999999907322051351244*cos(th2)*sin(th1) +
0.00220623499999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00220623499999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000359999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000035999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000276590000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000700000000000000003842723519198948*cos(th1)*sin(th2)
) + 0.000000000700000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 1.0) -
1.0*ddth2*((0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00951353124999999999363842206889785*sin(th1)*sin(th2) -
0.00951353124999999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000007000000000000003842723519198948*cos(th1)*cos
(th2) - 0.0000000007000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) - 0.00000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000028999999999999998083853395786991*cos(th1)*sin(th2)
) + 0.00000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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## Appendix Group 5

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0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999999907322051351244*cos(th1)*sin(th2) +
0.004323798999999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 1.0) -
1.0*dth4^2*(3.0*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th4) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4) +
0.10291838125000000525588461641746*cos(th4)*sin(th3) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3))) +
1.0*dth5^2*(2.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*dth3^2*(3.0*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0000001163000000000000577510349925817*cos(th3)*sin(th4) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000001163000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.609125*sin(th3) + 0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3)) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000001163000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
```

## Appendix Group 5

```
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.06471953125*sin(th3) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4) +
0.10291838125000000525588461641746*cos(th3)*sin(th4) +
0.10291838125000000525588461641746*cos(th4)*sin(th3) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0449298*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.4030929*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
dth6^2*((0.00458*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00865*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
```

## Appendix Group 5

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cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000071000000000000002974426921534571*cos(th6)*(sin(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) -
0.0000000003599999999999999760595454820992*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
```

[illegible]



## Appendix Group 5

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0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0848565*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + ddth3*((cos(conj(th3))*sin(conj(th4))
+ cos(conj(th4))*sin(conj(th3)))*(0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)
+ 0.000810849999999999837760888965476624*cos(th3)*sin(th4) +
0.000810849999999999837760888965476624*cos(th4)*sin(th3) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.24365*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.21325*cos(conj(th3))*cos(conj(th4))) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.24365*cos(th3) + 0.21325*cos(th3)*cos(th4) +
0.04109*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.04109*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.21325*cos(conj(th3))*cos(conj(th4))) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.609125*cos(th3) + 0.79875*cos(th3)*cos(th4) -
0.79875*sin(th3)*sin(th4)) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0100115785*cos(th3) + 0.0087624425*cos(th3)*cos(th4) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000470000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.06471953125*cos(th3) +
0.10291838125000000525588461641746*cos(th3)*cos(th4) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000071000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000003599999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00027659000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(t
h2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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cos(th4)*sin(th3)*(cos(th2)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))*(0.24365*cos(th3) + 0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.083*cos(th3)*sin(th4) + cos(th4)*sin(th3)))
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1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2)
+ cos(th2))*sin(th1)) + cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2) +
cos(th2))*sin(th1)) + cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1))*sin(th2) +
cos(th2))*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) +
0.001115917*sin(th3)*(cos(th1))*sin(th2) + cos(th2))*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)
*(cos(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2))) +
0.0021075725*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2)) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1))*cos(th2) -
1.0*sin(th1))*sin(th2)) + cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) -
1.0*sin(th1))*sin(th2)) - cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1))*sin(th2))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos
(th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) - 0.0021075725*cos(th3) +
0.0018446125*sin(th3)*sin(th4) +
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1)) + cos(th4)*sin(th3)*(cos(th1))*sin(th2)
+ cos(th2))*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2)
+ cos(th2))*sin(th1)) + cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2) +
cos(th2))*sin(th1)) + cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2))*sin(th1))) +
cos(th2))*sin(th1))) +

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## Appendix Group 5

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0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) - 0.001115917*cos(th3) +
0.000976685*sin(th3)*sin(th4) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 1.0) +
ddth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(0.00865*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) - 1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
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cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000359999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000003599999999999999760595454820992*cos(th6)*(sin(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th2)*sin(th1)) +
```

[illegible]



[illegible]

[illegible]

## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
2.0*dth1*dth2*(3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.000000000700000000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 2.0*dth3*dth4*(3.0*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*sin(th1) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4) +
0.10291838125000000525588461641746*cos(th4)*sin(th3) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
```

## Appendix Group 5

```
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) +
0.00000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3))) -
2.0*dth1*dth3*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4))*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))) -
2.0*dth2*dth3*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))) +
2.0*dth3*dth5*(2.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

```
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```



## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th
h4) - 1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*dth4*dth5*(2.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
```

## Appendix Group 5

```
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*dth1*dth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- 1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
```

[illegible]

[illegible]

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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## Appendix Group 5

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cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth3*dth6*((sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - 1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
cos(conj(th2))*sin(conj(th1))) +
cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*cos(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
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[illegible]



## Appendix Group 5

[illegible]

## Appendix Group 5

[illegible]

## Appendix Group 5

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sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth5*dth6*((sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th5
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - 1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000035999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*cos(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*cos(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(c
onj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th6))*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(c
os(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
th2)) + cos(conj(th2))*sin(conj(th1))) +
```

## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th6))*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(c
os(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(c
onj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))))))
```

**T5=**

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-
1.0*dth1^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.00000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.00000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00220623499999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*dth2^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000000289999999999999998083853395786991*cos(th1)*cos(th2) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999998083853395786991*sin(th1)*sin(th2) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000289999999999999998083853395786991*cos(th1)*sin
(th2) + 0.000000000289999999999999998083853395786991*cos(th2)*sin(th1) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
```

## Appendix Group 5

```
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00220623499999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.4030929*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
ddth3*(1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0100115785*cos(th3) + 0.0087624425*cos(th3)*cos(th4) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
```

## Appendix Group 5

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+ 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.24365*cos(th3) + 0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*
cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
```



## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) - 0.0021075725*cos(th3) +
0.0018446125*sin(th3)*sin(th4) +
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) - 0.001115917*cos(th3) +
0.000976685*sin(th3)*sin(th4) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 1.0) -
ddth5*((0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(th1))) +
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) - 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th2)*sin(th1)) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000007100000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
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[illegible]

## Appendix Group 5

```
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1))*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1))*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1))*sin(th2) + cos(th2)*sin(th1))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1))*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999999998866797093488579*cos(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0) - 1.0*dth5^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000470000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))+
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(
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[illegible]



## Appendix Group 5

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cos(th1)*cos(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) - 0.0000000002899999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000002899999999999999998083853395786991*cos(th1)*sin(th2)
+ 0.0000000002899999999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
cos(conj(th2))*sin(conj(th1))) -

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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
```



[illegible]

## Appendix Group 5

```
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000035999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.004323798999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.004323798999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
```

## Appendix Group 5

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0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 1.0) -
ddth4*(1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
- 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
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## Appendix Group 5

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0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00220623499999999969575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
+ 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.21325*cos(th3)*cos(th4) - 0.083*sin(th5)*(cos(th3)*cos(th4)
- 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
```



## Appendix Group 5

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cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0087624425*cos(th3)*cos(th4) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))) +
cos(conj(th4))*sin(conj(th3)))*(0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0002765900000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) + 0.000976685*sin(th3)*sin(th4)
- 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
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## Appendix Group 5

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) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) +
0.0018446125*sin(th3)*sin(th4) +
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 1.0) +
dth6^2*((0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
- 0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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[illegible]

[illegible]

## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0449298*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*dth4^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) - 0.0087624425*cos(th3)*sin(th4) - 0.0087624425*cos(th4)*sin(th3)
+ 0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.4030929*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
ddth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000007100000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000007100000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(0.00865*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
```

## Appendix Group 5

```
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- (0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(t
h1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000003599999999999999760595454820992*cos(th6)*(sin(th5)
)*cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00000000071000000000000002974426921534571*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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[illegible]

## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.00000000289999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000289999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000289999999999999998083853395786991*cos(th1)*sin
(th2) + 0.00000000289999999999999998083853395786991*cos(th2)*sin(th1) +
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999907322051351244*cos(th1)*sin(th2) +
0.004323798999999999907322051351244*cos(th2)*sin(th1) +
0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.004323798999999999907322051351244*cos(th1)*cos(th2) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.004323798999999999907322051351244*sin(th1)*sin(th2) -
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth1*dth4*(2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj
(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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[illegible]

## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth1*dth6*(1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
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[illegible]



[illegible]





## Appendix Group 5

[illegible]

[illegible]

## Appendix Group 5

[illegible]

[illegible]

## Appendix Group 5

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+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) - 0.0087624425*cos(th3)*sin(th4) - 0.0087624425*cos(th4)*sin(th3)
+ 0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth3*dth6*((0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(th2)*sin(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(th2)*sin(th1))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- 0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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## Appendix Group 5

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sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000000007100000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000007100000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000003599999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000007100000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
1.0*cos(conj(th6))*(0.00022093999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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1.0*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*cos(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(c
onj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
sin(conj(th6))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(c
os(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th2))*sin(conj(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(c
onj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin

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## Appendix Group 5

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(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- 0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000035999999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000035999999999999999760595454820992*cos(th6)*(cos(th
5))*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000035999999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
1.0*cos(conj(th6))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4))*cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
```

[illegible]

[illegible]

[illegible]



[illegible]

$$0.0087624425 \cdot \cos(\text{th3}) \cdot \sin(\text{th4}) \cdot (\cos(\text{th1}) \cdot \cos(\text{th2}) - 1.0 \cdot \sin(\text{th1}) \cdot \sin(\text{th2})) + 0.0087624425 \cdot \cos(\text{th4}) \cdot \sin(\text{th3}) \cdot (\cos(\text{th1}) \cdot \cos(\text{th2}) - 1.0 \cdot \sin(\text{th1}) \cdot \sin(\text{th2})))$$

**T6=**

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th6^2*((sin(conj(th6))*(cos(conj(th1))*(cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
cos(conj(th2))*sin(conj(th1)))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)

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## Appendix Group 5

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*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00002209399999999999998866797093488579*cos(th6)*(sin(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0007152999999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00002209399999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
dth1^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th1))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2)) -
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
```



## Appendix Group 5

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0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
dth2^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003801407100000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0848565*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0449298*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
ddth4*((1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))
+
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) + 0.000976685*sin(th3)*sin(th4)
- 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) +
0.0018446125*sin(th3)*sin(th4) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) - 1.0) +
ddth6*((1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))
+
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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[illegible]

## Appendix Group 5

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s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0003625*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) + 1.0) +
dth4^2*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos
(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00022093999999999999866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00038014071000000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0002209399999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00038014071000000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0002209399999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00038014071000000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
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## Appendix Group 5

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) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0018446125*cos(th3)*sin(th4) +
0.0018446125*cos(th4)*sin(th3)) -
0.0000220939999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000715299999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.000976685*cos(th3)*sin(th4) + 0.000976685*cos(th4)*sin(th3)
+ 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0000220939999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
dth5^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000022093999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000715299999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000022093999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000715299999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.001115917*sin(th3) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000976685*cos(th3)*sin(th4) + 0.000976685*cos(th4)*sin(th3) +
0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0000220939999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0021075725*sin(th3) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.0018446125*cos(th3)*sin(th4) + 0.0018446125*cos(th4)*sin(th3) -
0.0000220939999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000715299999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
ddth3*(1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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## Appendix Group 5

0.000976685\*sin(th3)\*sin(th4) - 0.0003625\*cos(th6)\*(cos(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) - 1.0\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) +  
0.00038014071000000000000002974426922\*cos(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3)) +  
0.0000220939999999999998866797093488579\*sin(th6)\*(cos(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) - 1.0\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3)))) + 1.0) +  
ddth1\*((cos(conj(th6))\*(cos(conj(th1))\*sin(conj(th2)) + cos(conj(th2))\*sin(conj(th1))) -  
sin(conj(th6))\*(1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)  
)) - 1.0\*sin(conj(th1))\*sin(conj(th2)))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) -  
cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.0000220939999999999998866797093488579\*cos(th6)\*(cos(th  
1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
0.00038014071000000000000002974426922\*cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
0.000504258\*cos(th1)\*cos(th2) + 0.0003625\*sin(th6)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))  
+ 0.000504258\*sin(th1)\*sin(th2) -  
0.0003625\*cos(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)))) +  
0.0000220939999999999998866797093488579\*sin(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin  
th2) + cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)))) -  
0.00038014071000000000000002974426922\*sin(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.001115917\*cos(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.000976685\*cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.000976685\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
(cos(conj(th6))\*(1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th  
2)) - 1.0\*sin(conj(th1))\*sin(conj(th2)))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) -  
cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) + 1.0\*sin(conj(th6))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.000952365\*cos(th1)\*cos(th2) +  
0.000717949640000000000000000239404545\*cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.000715299999999999987689291991443952\*cos(th6)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) +  
0.0000220939999999999998866797093488579\*sin(th6)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) -  
0.000952365\*sin(th1)\*sin(th2) -  
0.0000220939999999999998866797093488579\*cos(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin  
th2) + cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)))) +  
0.000715299999999999987689291991443952\*sin(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin  
th2) + cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)))) +  
0.000717949640000000000000000239404545\*sin(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
0.0021075725\*cos(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.0018446125\*cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.0018446125\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
(sin(conj(th6))\*(cos(conj(th1))\*cos(conj(th2)) - 1.0\*sin(conj(th1))\*sin(conj(th2)))) -  
cos(conj(th6))\*(1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2  
)) + cos(conj(th2))\*sin(conj(th1))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2)) + cos(conj(th2))\*sin(conj(th1))))  
- cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.0021075725\*cos(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + 0.000952365\*cos(th1)\*sin(th2) + 0.000952365\*cos(th2)\*sin(th1) +  
0.0000220939999999999998866797093488579\*cos(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos  
th2) - 1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2))) + cos(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -

## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000000239404545*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003801407100000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 1.0) +
ddth2*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 1.0) -
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## Appendix Group 5

[illegible]

[illegible]



## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth2*dth3*((1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*dth1*dth5*(1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
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[illegible]

[illegible]

[illegible]

[illegible]

## Appendix Group 5

```
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth1*dth2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)))-
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.00022093999999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.000504258*sin(th1)*sin(th2) - 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 0.0003801407100000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 2.0*dth3*dth6*((0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
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[illegible]

[illegible]

[illegible]

## Appendix Group 5

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cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(
cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
1.0*sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth3*dth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th
1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
```





## Appendix Group 5

```
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*dth2*dth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th
1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
```

[illegible]



## Appendix Group 5

```
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0002209399999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.0002209399999999999866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00071529999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0002209399999999999866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*dth4*dth5*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0002209399999999999866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

```
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.000022093999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000715299999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
```

## Appendix Group 5

```
0.000022093999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -  
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -  
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))
```

## Appendix Group 5

### IV. DYNAMIC ANALYSIS RESULT FOR LEFT ROBOT ARM

	T	T(1, 1)	T(2, 1)	T(3, 1)	T(4, 1)	T(5, 1)	T(6, 1)
6x1 sym							
1	1x1 sym						
2	1x1 sym						
3	1x1 sym						
4	1x1 sym						
5	1x1 sym						
6	1x1 sym						

Fig. 2: T Variables Calculated of Dynamic Equation of Left Robot Arm (3)in Matlab

T1=

```

ddth1*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.00000000035999999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.0000000007100000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007100000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -

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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(conj(th1))*(0.002685799999999999062028077645436*cos(th1) -
0.00000000236000000000000001221691374637696*sin(th1)) +
cos(conj(th1))*(0.002685799999999999062028077645436*cos(th1) +
0.00000000236000000000000001221691374637696*sin(th1)) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.00000000070000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
+
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*sin(conj(th1))*(0.000000023600000000000001221691374637696*cos(th1) -
0.0026857999999999999062028077645436*sin(th1)) +
sin(conj(th1))*(0.000000023600000000000001221691374637696*cos(th1) +
0.0026857999999999999062028077645436*sin(th1)) - 1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.0000506770000000000002859906755858788*cos(th1)*sin(th2) +
0.0000506770000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999907322051351244*cos(th1)*sin(th2) +
0.004323798999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
```

## Appendix Group 5

```
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000594270000000000177655667954468299*cos(th1)*cos(th2) -
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000059427000000000177655667954468299*sin(th1)*sin(th2) +
0.000000000289999999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.000022093999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.004323798999999999907322051351244*cos(th1)*cos(th2) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.004323798999999999907322051351244*sin(th1)*sin(th2) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
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## Appendix Group 5

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0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0015848387499999985192733475969362*cos(th1)*cos(th2) -
0.0015848387499999985192733475969362*sin(th1)*sin(th2) -
0.00330754875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0015848387499999985192733475969362*cos(th1)*sin(th2) +
0.0015848387499999985192733475969362*cos(th2)*sin(th1) -
0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.00000000289999999999999998083853395786991*cos(th2)*sin(th1) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000059427000000000177655667954468299*cos(th1)*sin(th2) +
0.000059427000000000177655667954468299*cos(th2)*sin(th1) +
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.042527937499999999917060788945378*cos(th1)*sin(th2) +
0.042527937499999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.00000002620000000000000515083869247245*cos(th2)*sin(th1) +
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## Appendix Group 5

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0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.042527937499999999917060788945378*sin(th1)*sin(th2) -
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.000000002620000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000026200000000000000515083869247245*sin(th1)*sin(th2) +
0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
ddth5*(1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3))*sin(th4)*(cos(th1))*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3))*cos(th4)*(cos(th1))*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00458*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*sin(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2))) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(
cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th5)*(cos(th3))*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1))*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000289999999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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## Appendix Group 5

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0.0027659000000000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)+(cos(th1)*sin(th2)+
cos(th2)*sin(th1))+ cos(th4)*sin(th3)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) +
0.000276590000000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2)+
cos(th2)*sin(th1))- 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))))+
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))+(cos(conj(th1))*sin(conj(th2))+
cos(conj(th2))*sin(conj(th1)))+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))+
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2))+
cos(conj(th2))*sin(conj(th1))))-
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))+
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))+
cos(th4)*sin(th3)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))-
cos(th3)*cos(th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2)- 1.0*sin(th1)*sin(th2))+ cos(th4)*sin(th3)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))- cos(th3)*cos(th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))))+
0.00027659000000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))+ cos(th4)*sin(th3)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))) +
0.00027659000000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))- cos(th3)*cos(th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))))+
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))))+
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))))+
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))+ cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.00220623499999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)+
cos(th2)*sin(th1))+ cos(th4)*sin(th3)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) +
0.00220623499999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2)+
cos(th2)*sin(th1))- 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1)))+
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2)+
cos(th2)*sin(th1))- 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))+
cos(conj(th2))*sin(conj(th1)))+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))+
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2))+
cos(conj(th2))*sin(conj(th1))))-
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))+
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999969575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))+ cos(th4)*sin(th3)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))-
0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))+ cos(th4)*sin(th3)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)-
1.0*sin(th1)*sin(th2))- cos(th3)*cos(th4)*(cos(th1)*cos(th2)- 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2))+ cos(conj(th2))*sin(conj(th1)))-
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)- 1.0*sin(conj(th1))*sin(conj(th2))))+
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))))-
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))-
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))+
cos(th4)*sin(th3)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1)))+
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))-
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))+ cos(th4)*sin(th3)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))-
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))))+
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))+ cos(th4)*sin(th3)*(cos(th1)*sin(th2)+ cos(th2)*sin(th1))) +
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[illegible]

## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0) + ddth2*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000700000000000000003842723519198948*cos(th1)*sin
(th2) + 0.000000000700000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0002209399999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0002209399999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00050677000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.00050677000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.00050677000000000002859906755858788*cos(th1)*sin(th2) +
0.00050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) +
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## Appendix Group 5

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(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000594270000000000177655667954468299*cos(th1)*cos(th2) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000594270000000000177655667954468299*sin(th1)*sin(th2) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

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0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000007100000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*sin(th1)*sin(th2) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.0000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00059427000000000177655667954468299*cos(th1)*sin(th2) +
0.00059427000000000177655667954468299*cos(th2)*sin(th1) +
0.0002002100000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0002002100000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.006180941249999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.0000506770000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.009513531249999999363842206889785*sin(th1)*sin(th2) -
0.009513531249999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.04252793749999999917060788945378*cos(th1)*sin(th2) +
0.04252793749999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000262000000000000000515083869247245*cos(th2)*sin(th1) +
0.01301634999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04252793749999999917060788945378*sin(th1)*sin(th2) -
0.04252793749999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000002620000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000262000000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0130163499999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) -
1.0*dth2^2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.00005067700000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0007923500000000004212463711184*cos(th1)*cos(th2) +
0.00005067700000000002859906755858788*cos(th1)*sin(th2) +
0.00005067700000000002859906755858788*cos(th2)*sin(th1) -
0.0007923500000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0007923500000000004212463711184*cos(th1)*sin(th2) -
0.00005067700000000002859906755858788*cos(th1)*cos(th2) +
0.0007923500000000004212463711184*cos(th2)*sin(th1) +
0.00005067700000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00005067700000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.00005067700000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2))) -
1.0*dth3^2*(4.0*(0.006180941249999999170607889453777*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th
2) + cos(th2)*sin(th1)) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.7555*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)) - 3.7555*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)) + 4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + dth5^2*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00200210000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
dth4^2*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0000000000700000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000000700000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000000700000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
dth1^2*(6.0*cos(conj(th1))*(0.000000023600000000000001221691374637696*cos(th1) -
0.002685799999999999062028077645436*sin(th1)) -
6.0*cos(conj(th1))*(0.000000023600000000000001221691374637696*cos(th1) +
0.002685799999999999062028077645436*sin(th1)) +
6.0*sin(conj(th1))*(0.002685799999999999062028077645436*cos(th1) -
0.000000023600000000000001221691374637696*sin(th1)) +
6.0*sin(conj(th1))*(0.002685799999999999062028077645436*cos(th1) +
0.000000023600000000000001221691374637696*sin(th1))) -
ddth6*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
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## Appendix Group 5

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+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00022093999999999998866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000262000000000000000515083869247245*cos(th3)*(cos(th1)*
sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000070000000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.000000000070000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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0.083*cos(conj(th5))*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) +  
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -  
0.1101*sin(conj(th1))*sin(conj(th2)) -  
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) +  
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(t  
h2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))  
- sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +  
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2)))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000007100000000000002974426921534571*cos(th6)*(co  
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +  
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
0.000000000359999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si  
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.0002765900000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)  
+ cos(conj(th2))*sin(conj(th1)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.0000000035999999999999760595454820992*sin(th6)*(cos(th  
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -  
0.000000000710000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co  
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +  
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.00027659000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +  
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)  
) + cos(conj(th2))*sin(conj(th1))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -  
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th4)*cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))*(0.000955108*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))*(0.00330754875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000070000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000007000000000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.938875*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)) + 0.938875*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)) + 1.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0) +
1.0*ddth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000007000000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000000700000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000000700000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00527636874999999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0002209399999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
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## Appendix Group 5

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n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000359999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000002899999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*s
in(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000470000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000470000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000470000000000000313402995165391*sin(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000470000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
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## Appendix Group 5

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1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 1.0) +
dth6^2*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000359999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000359999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*dth3*dth6*(1.0*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
2.0*dth4*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
```

## Appendix Group 5

```
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*dth5*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
```

## Appendix Group 5

```
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(
conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) + +
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## Appendix Group 5

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0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*dth1*dth2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00142135000000000000439426273146637*cos(th1)*sin(th2) +
0.00142135000000000000439426273146637*cos(th2)*sin(th1) -
0.00005067700000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000792350000000000004212463711184*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th1)*sin(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) -
0.000792350000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000792350000000000004212463711184*cos(th1)*sin(th2) -
0.00005067700000000000002859906755858788*cos(th1)*cos(th2) +
0.000792350000000000004212463711184*cos(th2)*sin(th1) +
0.00005067700000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.00142135000000000000439426273146637*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) +
0.00142135000000000000439426273146637*sin(th1)*sin(th2))) -
2.0*dth1*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000028999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000289999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*dth2*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
```



## Appendix Group 5

```
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth3*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0002002100000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002002100000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0002002100000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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[illegible]

## Appendix Group 5

```
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth4*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000289999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000289999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000289999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00220623499999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

```
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth1*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) + 2.0*dth2*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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4.0*cos(conj(th3))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.01301634999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000000700000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.005276368749999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.005276368749999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000700000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.005276368749999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.005276368749999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000007000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 2.0*dth3*dth4*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000700000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

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0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
2.0*dth1*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000071000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000359999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000359999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
```



## Appendix Group 5

```
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000022093999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))))

```

T2=

$$\begin{aligned} & \text{ddth5} * (1.0 * (\cos(\text{conj}(\text{th6})) * (1.0 * \sin(\text{conj}(\text{th5})) * (\cos(\text{conj}(\text{th3})) * \sin(\text{conj}(\text{th4})) * (\cos(\text{conj}(\text{th1})) * \\ & \cos(\text{conj}(\text{th2})) - 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2}))) + \\ & \cos(\text{conj}(\text{th4})) * \sin(\text{conj}(\text{th3})) * (\cos(\text{conj}(\text{th1})) * \cos(\text{conj}(\text{th2})) - \\ & 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2})))) - \\ & \cos(\text{conj}(\text{th5})) * (\cos(\text{conj}(\text{th3})) * \cos(\text{conj}(\text{th4})) * (\cos(\text{conj}(\text{th1})) * \cos(\text{conj}(\text{th2})) - \\ & 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2}))) - \\ & 1.0 * \sin(\text{conj}(\text{th3})) * \sin(\text{conj}(\text{th4})) * (\cos(\text{conj}(\text{th1})) * \cos(\text{conj}(\text{th2})) - \\ & 1.0 * \sin(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2})))) + 1.0 * \sin(\text{conj}(\text{th6})) * (\cos(\text{conj}(\text{th1})) * \sin(\text{conj}(\text{th2})) + \\ & \cos(\text{conj}(\text{th2})) * \sin(\text{conj}(\text{th1}))) * (0.0003625 * \cos(\text{th6}) * (\cos(\text{th5}) * (\cos(\text{th3}) * \sin(\text{th4})) * (\cos(\text{th1}) * \sin \\ & (\text{th2}) + \cos(\text{th2}) * \sin(\text{th1})) + \cos(\text{th4}) * \sin(\text{th3}) * (\cos(\text{th1}) * \sin(\text{th2}) + \cos(\text{th2}) * \sin(\text{th1})) + \end{aligned}$$



## Appendix Group 5

```
0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(
cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
```

## Appendix Group 5

```
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*sin
(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0022062349999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0) + ddth1*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0002765900000000000064255453289617*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0007923500000000000004212463711184*cos(th1)*sin(th2) -
0.00005067700000000000002859906755858788*cos(th1)*cos(th2) +
0.0007923500000000000004212463711184*cos(th2)*sin(th1) +
0.00005067700000000000002859906755858788*sin(th1)*sin(th2)) +
1.0*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
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## Appendix Group 5

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0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.00000000070000000000000003842723519198948*cos(th2)*sin(th1) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00002209399999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0007923500000000004212463711184*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th1)*sin(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) -
0.0007923500000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000276590000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
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## Appendix Group 5

0.0003625\*cos(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
cos(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) -  
cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
0.0000220939999999999998866797093488579\*sin(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos  
(th2) - 1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2))) + cos(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
0.0003801407100000000000002974426922\*cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
0.0000220939999999999998866797093488579\*cos(th6)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.000380140710000000000000002974426922\*sin(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
0.0003625\*sin(th6)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.000976685\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) +  
0.000976685\*cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) + cos(conj(th2))\*sin(conj(th1)))  
+ cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.0000000007000000000000003842723519198948\*cos(th1)\*cos(th2)  
) - 0.000000000700000000000000003842723519198948\*sin(th1)\*sin(th2) +  
0.000000011630000000000000577510349925817\*cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) +  
0.00081084999999999837760888965476624\*cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) +  
0.00081084999999999837760888965476624\*cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) -  
0.000000011630000000000000577510349925817\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + (cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))\*(0.00158483874999999985192733475969362\*cos(th1)\*cos(th2) -  
0.0015848387499999985192733475969362\*sin(th1)\*sin(th2) -  
0.00330754875\*cos(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.005276368749999999363842206889785\*cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))  
+ 0.000000000700000000000000003842723519198948\*cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) +  
0.0000000007000000000000003842723519198948\*cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + 0.005276368749999999363842206889785\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2)  
+ cos(th2)\*sin(th1)) + (cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1)))\*(0.00330754875\*cos(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + 0.0015848387499999985192733475969362\*cos(th1)\*sin(th2) +  
0.0015848387499999985192733475969362\*cos(th2)\*sin(th1) -  
0.005276368749999999363842206889785\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.005276368749999999363842206889785\*cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) -  
0.0000000007000000000000003842723519198948\*cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) -  
0.0000000007000000000000003842723519198948\*cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + (cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))\*(0.06471953125\*cos(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + 0.009513531249999999363842206889785\*cos(th1)\*sin(th2) +  
0.009513531249999999363842206889785\*cos(th2)\*sin(th1) -  
0.10291838125000000525588461641746\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.10291838125000000525588461641746\*cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.000000011630000000000000577510349925817\*cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.000000011630000000000000577510349925817\*cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + (0.24365\*cos(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) + 0.11985\*cos(conj(th1))\*sin(conj(th2)) +  
0.11985\*cos(conj(th2))\*sin(conj(th1))\*(0.938875\*cos(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + 0.31265\*cos(th1)\*sin(th2) + 0.31265\*cos(th2)\*sin(th1)) +  
1.0\*(1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) + cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2))  
+ cos(conj(th2))\*sin(conj(th1))) -  
cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.000000004700000000000000313402995165391\*cos(th5)\*(cos(th3





## Appendix Group 5

```
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + 0.015369996250000000390976140351995*cos(th1)*sin(th2) +
0.015369996250000000390976140351995*cos(th2)*sin(th1) -
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000000003842723519198948*cos(th1)*sin
(th2) + 0.00000000070000000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
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## Appendix Group 5

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cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000506770000000000000002859906755858788*cos(th1)*sin(th2) -
0.001421350000000000000439426273146637*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) +
0.001421350000000000000439426273146637*sin(th1)*sin(th2)) + (cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000792350000000000004212463711184*cos(th1)*cos(th2) +
0.00005067700000000000002859906755858788*cos(th1)*sin(th2) +
0.00005067700000000000002859906755858788*cos(th2)*sin(th1) -
0.000792350000000000004212463711184*sin(th1)*sin(th2)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2)
+ 0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.02685*cos(conj(th1))*cos(conj(th2)) + 0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999907322051351244*cos(th1)*sin(th2) +
0.004323798999999999907322051351244*cos(th2)*sin(th1) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00220623499999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*c
```

## Appendix Group 5

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os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000200210000000000000926779486487561*cos(th5)*(cos(th3)*s
in(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000594270000000000177655667954468299*cos(th1)*cos(th2) -
0.000000000289999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000059427000000000177655667954468299*sin(th1)*sin(th2) +
0.00000000028999999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000955108*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.004323798999999999907322051351244*cos(th1)*cos(th2) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.004323798999999999907322051351244*sin(th1)*sin(th2) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
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## Appendix Group 5

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0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0015848387499999985192733475969362*cos(th1)*cos(th2) -
0.0015848387499999985192733475969362*sin(th1)*sin(th2) -
0.00330754875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + (cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0015848387499999985192733475969362*cos(th1)*sin(th2) +
0.0015848387499999985192733475969362*cos(th2)*sin(th1) -
0.0052763687499999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000028999999999999998083853395786991*cos(th1)*sin
(th2) + 0.00000000289999999999999998083853395786991*cos(th2)*sin(th1) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.02685*cos(conj(th1))*sin(conj(th2)) + 0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000955108*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000059427000000000177655667954468299*cos(th1)*sin(th2) +
0.000059427000000000177655667954468299*cos(th2)*sin(th1) +
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00083594*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00083594*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.015369996250000000390976140351995*cos(th1)*cos(th2) -
0.015369996250000000390976140351995*sin(th1)*sin(th2) -
0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000026200000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.04252793749999999917060788945378*cos(th1)*sin(th2) +
0.04252793749999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.00000002620000000000000515083869247245*cos(th2)*sin(th1) +
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## Appendix Group 5

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0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.042527937499999999917060788945378*sin(th1)*sin(th2) -
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.000000002620000000000000515083869247245*cos(th1)*cos(th2) -
0.00000000262000000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) -
1.0*dth1^2*(5.0*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th1)*sin(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2))) -
1.0*dth2^2*(5.0*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th1)*sin(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.000050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.000050677000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.000050677000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.000050677000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2))) -
1.0*dth3^2*(4.0*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0061809412499999999170607889453777*cos(th3)*(cos(th1)*sin(th
2) + cos(th2)*sin(th1))) -
0.00000000262000000000000000515083869247245*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.7555*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) - 3.7555*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) + 4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)))) + dth5^2*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0002002100000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000002899999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000002899999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
dth4^2*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.005276368749999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000001163000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.005276368749999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

[illegible]

## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000220939999999998866797093488579*cos(th6)*(1.0*sin(th
5))*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - 1.0) +
1.0*ddth3*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*
cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

```
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - (0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000002620000000000000515083869247245*cos(th3)*(cos(th1)*
sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00330754875*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.00000000070000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(t
h2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
- sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000007100000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) - 0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) - 0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) + (cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) + sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) - 1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))*(0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 0.000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 0.0007179496400000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - (0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) + 0.1101*cos(conj(th2))*sin(conj(th1)) + 0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) + 0.1101*sin(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

```
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999969575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00220623499999999969575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000007000000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000007000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - (cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*sin(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 1.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00083594*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00083594*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) -
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - (0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*s
in(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + 1.0) +
dth6^2*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00002209399999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00002209399999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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## Appendix Group 5

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0.00000000003599999999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000071000000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1))*(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*dth3*dth6*(1.0*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
```





## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
1.0*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th2)*sin(th1)) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))*cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + 0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + 0.1101*cos(conj(th1))*cos(conj(th2)) -
0.1101*sin(conj(th1))*sin(conj(th2)) -
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
2.0*dth4*dth6*(1.0*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
```



[illegible]

## Appendix Group 5

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2.0*dth5*dth6*(1.0*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)
)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))))) +
(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(
th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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[illegible]

## Appendix Group 5

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0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*dth1*dth2*(5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00050677000000000004212463711184*cos(th1)*cos(th2) +
0.0014213500000000000439426273146637*cos(th1)*sin(th2) +
0.0014213500000000000439426273146637*cos(th2)*sin(th1) -
0.00050677000000000002859906755858788*sin(th1)*sin(th2)) - 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00079235000000000004212463711184*cos(th1)*cos(th2) +
0.00050677000000000002859906755858788*cos(th1)*sin(th2) +
0.00050677000000000002859906755858788*cos(th2)*sin(th1) -
0.00079235000000000004212463711184*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00079235000000000004212463711184*cos(th1)*sin(th2) -
0.00050677000000000002859906755858788*cos(th1)*cos(th2) +
0.00079235000000000004212463711184*cos(th2)*sin(th1) +
0.00050677000000000002859906755858788*sin(th1)*sin(th2)) + 5.0*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.00050677000000000002859906755858788*cos(th1)*sin(th2) -
0.0014213500000000000439426273146637*cos(th1)*cos(th2) +
0.00050677000000000002859906755858788*cos(th2)*sin(th1) +
0.0014213500000000000439426273146637*sin(th1)*sin(th2))) -
2.0*dth1*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00020021000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000002899999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000289999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*
```

## Appendix Group 5

```
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*dth2*dth5*(2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) - 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000200210000000000000926779486487561*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000028999999999999998083853395786991*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(cos(conj(th1))*cos(conj(th2)) -
```



## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000028999999999999998083853395786991*cos(th5)*(cos(
th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```



## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth4*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.1101*cos(conj(th1))*cos(conj(th2)) +
0.1101*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 2.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(t
h4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000028999999999999998083853395786991*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000028999999999999998083853395786991*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00020021000000000000926779486487561*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000028999999999999998083853395786991*sin(th5)*(cos(
th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00020021000000000000926779486487561*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000028999999999999998083853395786991*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
```

[illegible]

## Appendix Group 5

```
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth1*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) + 2.0*dth2*dth3*(4.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(t
h1)*sin(th2) + cos(th2)*sin(th1)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th3)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0061809412499999999170607889453777*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
4.0*cos(conj(th3))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
3.7555*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.11985*cos(conj(th1))*cos(conj(th2)) +
0.11985*sin(conj(th1))*sin(conj(th2))) +
4.0*sin(conj(th3))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.013016349999999995978861022649653*cos(th3)*(cos(th1)*sin(th2
) + cos(th2)*sin(th1)) - 0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.7555*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.11985*cos(conj(th1))*sin(conj(th2)) +
0.11985*cos(conj(th2))*sin(conj(th1))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
```

## Appendix Group 5

```
0.00000000007000000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000000070000000000000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1)))*(0.000000000070000000000000000000003842723519198948*cos(th3)*cos(th4)
*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000000070000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*sin(conj(th2)))*(0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000070000000000000000000003842723519198948*cos(th3)*cos(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0052763687499999999363842206889785*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.0052763687499999999363842206889785*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000000070000000000000000000003842723519198948*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 2.0*dth3*dth4*(3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.02685*cos(conj(th1))*sin(conj(th2)) +
0.02685*cos(conj(th2))*sin(conj(th1)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
```

## Appendix Group 5

```
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th3)*sin(th4)
*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.000000000070000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.005276368749999999363842206889785*sin(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.005276368749999999363842206889785*sin(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.005276368749999999363842206889785*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000070000000000000000003842723519198948*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000070000000000000000003842723519198948*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) - 0.02685*cos(conj(th1))*cos(conj(th2)) +
0.02685*sin(conj(th1))*sin(conj(th2)) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))) -
2.0*dth1*dth6*((cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
```





## Appendix Group 5

```
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000359999999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000000359999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
```



## Appendix Group 5

```
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))*(0.24365*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + 0.1101*cos(conj(th1))*sin(conj(th2)) +
0.1101*cos(conj(th2))*sin(conj(th1)) -
0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.21325*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - (1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(
th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
```

## Appendix Group 5

```
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))))
```

**T3=**

```
3.2348475*cos(th3) + 2.60578125*cos(th3)*cos(th4) + 0.4030929*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 2.60578125*sin(th3)*sin(th4) +
ddth5*((0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*(0.083*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.083*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
```

## Appendix Group 5

```
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 0.24365*cos(conj(th3)) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) + 0.21325*sin(conj(th3))*sin(conj(th4))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(
conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (0.04109*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.04109*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.24365*cos(conj(th3)) + 0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
```

[illegible]

## Appendix Group 5

```
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) - 1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*sin(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*sin(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0) - 1.0*ddth1*((0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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## Appendix Group 5

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0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000000070000000000000000000003842723519198948*cos(th1)*cos
(th2) - 0.000000000070000000000000000000003842723519198948*sin(th1)*sin(th2) +
0.00000001163000000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.609125*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.00000000047000000000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) - 0.0000000002899999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000002899999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.0000000002899999999999998083853395786991*cos(th1)*sin(th2)
) + 0.0000000002899999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0043237989999999999907322051351244*cos(th1)*sin(th2) +
0.0043237989999999999907322051351244*cos(th2)*sin(th1) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00432379899999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000070000000000000000000003842723519198948*cos(th1)*sin(th2)
) + 0.000000000070000000000000000000003842723519198948*cos(th2)*sin(th1) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0008108499999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0008108499999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00951353124999999999363842206889785*cos(th1)*sin(th2) +
0.00951353124999999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000026200000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000026200000000000000515083869247245*cos(th2)*sin(th1) +
0.0130163499999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00002209399999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
```



## Appendix Group 5

```
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.13686363750000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))*(0.0000000026200000000000000515083869247245*cos(th1)*cos(th
2) - 0.0000000026200000000000000515083869247245*sin(th1)*sin(th2) +
0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))*(0.13686363750000000223270291144217*cos(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + 0.042527937499999999917060788945378*cos(th1)*sin(th2) +
0.042527937499999999917060788945378*cos(th2)*sin(th1) +
0.00000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 1.0) -
1.0*ddth2*((0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.10618*cos(th1)*sin(th2) + 0.10618*cos(th2)*sin(th1) +
0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
```

## Appendix Group 5

```
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0002765900000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000007000000000000003842723519198948*cos(th1)*cos
(th2) - 0.0000000007000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos
```





## Appendix Group 5

```
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000359999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000359999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000276590000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.004323798999999999999907322051351244*cos(th1)*cos(th2) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.004323798999999999999907322051351244*sin(th1)*sin(th2) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th1)*sin(th2)
) + 0.00000000070000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.000000002620000000000000515083869247245*cos(th1)*sin(th2) -
0.000000002620000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
```

## Appendix Group 5

```
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
```



## Appendix Group 5

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cos(conj(th4))*sin(conj(th3)))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + (0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
- 0.24365*cos(conj(th3)) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*sin(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
```

## Appendix Group 5

```
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (0.24365*cos(conj(th3)) + 0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.21325*cos(th3)*cos(th4) +
0.04109*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.04109*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(t
h2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
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## Appendix Group 5

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0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000035999999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0087624425*cos(th3)*cos(th4) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.0022062349999999999969575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + (0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.79875*cos(th3)*cos(th4) - 0.79875*sin(th3)*sin(th4))*(0.24365*cos(conj(th3)) +
0.21325*cos(conj(th3))*cos(conj(th4)) - 0.21325*sin(conj(th3))*sin(conj(th4))) +
(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0002765900000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.0000000007100000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) + 0.000976685*sin(th3)*sin(th4)
- 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
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## Appendix Group 5

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0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
dth1^2*(4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.136863637500000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.042527937499999999917060788945378*cos(th1)*sin(th2) +
0.042527937499999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000000262000000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000026200000000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.9746*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2) +
0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.042527937499999999917060788945378*sin(th1)*sin(th2) -
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.136863637500000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000262000000000000000515083869247245*cos(th1)*cos(th2) -
0.0000000026200000000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.9746*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1))) +
dth2^2*(4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.136863637500000000223270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.042527937499999999917060788945378*cos(th1)*sin(th2) +
0.042527937499999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000000026200000000000000000515083869247245*cos(th1)*sin(th2) -
0.0000000026200000000000000000515083869247245*cos(th2)*sin(th1) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.9746*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.31265*sin(th1)*sin(th2) - 0.31265*cos(th1)*cos(th2) +
0.938875*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.042527937499999999917060788945378*sin(th1)*sin(th2) -
0.042527937499999999917060788945378*cos(th1)*cos(th2) +
0.136863637500000000223270291144217*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1)))*(0.0000000026200000000000000515083869247245*cos(th1)*cos(th2) -
0.000000002620000000000000000515083869247245*sin(th1)*sin(th2) +
0.0000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.013016349999999995978861022649653*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.9746*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.938875*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.31265*cos(th1)*sin(th2) + 0.31265*cos(th2)*sin(th1)) -
1.0*dth4^2*(3.0*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th4) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4) +
0.10291838125000000525588461641746*cos(th4)*sin(th3) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3))*(0.24365*cos(conj(th3)) + 0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*dth5^2*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - 2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))*(0.24365*cos(conj(th3)) +
0.21325*cos(conj(th3))*cos(conj(th4)) - 0.21325*sin(conj(th3))*sin(conj(th4))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
ddth3*((cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0000000116300000000000000577510349925817*cos(th3)*cos(th4) +
0.000810849999999999837760888965476624*cos(th3)*sin(th4) +
0.000810849999999999837760888965476624*cos(th4)*sin(th3) -
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 0.24365*cos(conj(th3)) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))*(0.24365*cos(th3) + 0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th3))*(0.13686363750000000223270291144217*cos(th3) + 0.0000000001*sin(th3)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + (cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.06471953125*cos(th3) +
0.10291838125000000525588461641746*cos(th3)*cos(th4) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)) +
(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.24365*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000035999999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00027659000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00220623499999999999669575423411061*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*sin(conj(th3))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) - 0.0021075725*cos(th3) +
0.0018446125*sin(th3)*sin(th4) +
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
cos(conj(th3))*(0.0130163499999999995978861022649653*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
- 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0130163499999999995978861022649653*cos(th3)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) - 0.001115917*cos(th3) +
0.000976685*sin(th3)*sin(th4) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.22875689375*sin(conj(th3))*sin(th3)*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.22875689375*sin(conj(th3))*sin(th3)*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + 1.0) +
0.0449298*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 0.4030929*cos(th5)*(cos(th3)*sin(th4)
+ cos(th4)*sin(th3)) + dth6^2*((0.00458*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00865*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 0.24365*cos(conj(th3)) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) + 0.21325*sin(conj(th3))*sin(conj(th4))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000359999999999999760595454820992*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000710000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000035999999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- (0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000071000000000000002974426921534571*cos(th6)*(sin(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) -
0.0000000003599999999999999760595454820992*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00022093999999999998866797093488579*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) +
0.00022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0000220939999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) +
sin(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000715299999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos
(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0848565*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
ddth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000359999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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## Appendix Group 5

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cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(0.00865*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 0.24365*cos(conj(th3)) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) + 0.21325*sin(conj(th3))*sin(conj(th4))) -
1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000035999999999999999760595454820992*cos(th6)*(sin(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000022093999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*cos(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th
4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0003625*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
sin(conj(th6))*(0.000715299999999999987689291991443952*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0000220939999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
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## Appendix Group 5

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cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00002209399999999999999866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000715299999999999987689291991443952*cos(th6)*(1.0*sin(
th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00002209399999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0)
- 2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000810849999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000810849999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
```



## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0008108499999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))) + 2.0*dth1*dth2*(4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.1368636375000000023270291144217*cos(th3)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + 0.04252793749999999917060788945378*cos(th1)*sin(th2) +
0.04252793749999999917060788945378*cos(th2)*sin(th1) +
0.0000000001*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
```



## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3))*(0.24365*cos(conj(th3)) + 0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)) + 3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
2.0*dth3*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - 2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))*(0.24365*cos(conj(th3)) +
0.21325*cos(conj(th3))*cos(conj(th4)) - 0.21325*sin(conj(th3))*sin(conj(th4))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000470000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000470000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*dth4*dth5*(2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - 2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))*(0.24365*cos(conj(th3)) +
0.21325*cos(conj(th3))*cos(conj(th4)) - 0.21325*sin(conj(th3))*sin(conj(th4))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
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## Appendix Group 5

[illegible]

## Appendix Group 5

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0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
2.0*dth1*dth3*(4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0130163499999999995978861022649653*cos(th3)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0130163499999999995978861022649653*cos(th3)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.915027575*sin(conj(th3))*sin(th3)*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.915027575*sin(conj(th3))*sin(th3)*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth2*dth3*(4.0*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000001*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 4.0*cos(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0130163499999999995978861022649653*cos(th3)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) - 0.00000000001*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 4.0*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000001*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.13686363750000000223270291144217*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 4.0*cos(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0130163499999999995978861022649653*cos(th3)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) - 0.00000000001*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.915027575*sin(conj(th3))*sin(th3)*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.915027575*sin(conj(th3))*sin(th3)*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth1*dth6*((0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+
cos(th2)*sin(th1)))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(c
onj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
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*cos(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
cos(th2)*sin(th1))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)

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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.000220939999999999999866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000220939999999999999866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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[illegible]

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## Appendix Group 5

```
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.002206234999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*dth3*dth6*((0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000000007100000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 0.24365*cos(conj(th3)) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) + 0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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[illegible]



[illegible]



## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th6))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(c
os(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th6))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(c
os(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(c
onj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.00071529999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth5*dth6*((0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.24365*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) + 0.24365*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 0.24365*cos(conj(th3)) +
0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) + 0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000003599999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
1.0*cos(conj(th6))*(0.000022093999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
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[illegible]



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0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.0003215650000000021871615629720509*cos(th5)*(cos(th3)*sin  
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1))) -  
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -  
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2)))) +  
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos  
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -  
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.0000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)  
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
1.0*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +  
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +  
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -  
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -  
1.0*sin(th1)*sin(th2))))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))  
- 1.0*sin(conj(th1))*sin(conj(th2))) +  
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))  
+ cos(conj(th2))*sin(conj(th1)))) -  
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +  
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th  
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +  
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -  
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -  
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +  
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +  
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) +  
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))) -  
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -  
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000359999999999999760595454820992*sin(th6)*(co  
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) + 0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) - (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) - cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))))*(0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) + 0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + 0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) + 0.00022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) - 1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))))*(0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + 0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
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[illegible]

## Appendix Group 5

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sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0) + ddth4*((cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0000000116300000000000000577510349925817*cos(th3)*cos(th4) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3) -
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + (cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
+ 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*sin(th3)*sin(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000470000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
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## Appendix Group 5

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cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000004700000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000007100000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000035999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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## Appendix Group 5

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0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000276590000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0087624425*cos(th3)*cos(th4) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + (0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.79875*cos(th3)*cos(th4) - 0.79875*sin(th3)*sin(th4))
- (1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(
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## Appendix Group 5

th4) - 1.0\*sin(th3)\*sin(th4)) - 0.000976685\*cos(th3)\*cos(th4) + 0.000976685\*sin(th3)\*sin(th4)  
- 0.0003625\*cos(th6)\*(cos(th5)\*(cos(th3)\*cos(th4) - 1.0\*sin(th3)\*sin(th4)) -  
1.0\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) +  
0.0003801407100000000000002974426922\*cos(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3)) +  
0.000022093999999999999866797093488579\*sin(th6)\*(cos(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) - 1.0\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) +  
sin(conj(th6))\*(cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) + cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2))  
+ cos(conj(th2))\*sin(conj(th1))) +  
sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.00071529999999999987689291991443952\*sin(th6)\*(cos(th5)\*(co  
s(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2)  
+ cos(th2)\*sin(th1))) + sin(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
0.000022093999999999999866797093488579\*cos(th6)\*(cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2)  
+ cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
sin(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
0.00071794964000000000000000239404545\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.00071794964000000000000000239404545\*cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.0018446125\*cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.0018446125\*cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
cos(conj(th6))\*(cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.0003625\*cos(th6)\*(cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)  
)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - sin(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)))) -  
0.000022093999999999999866797093488579\*sin(th6)\*(cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2)  
+ cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
sin(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) -  
cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)))) -  
0.000380140710000000000000002974426922\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
0.000380140710000000000000002974426922\*cos(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
0.000976685\*cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) +  
0.000976685\*cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
1.0\*sin(conj(th6))\*(cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4)) -  
1.0\*sin(conj(th3))\*sin(conj(th4))) - 1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4)) +  
cos(conj(th4))\*sin(conj(th3))))\*(0.00071794964000000000000000239404545\*sin(th5)\*(cos(th3)\*cos(  
th4) - 1.0\*sin(th3)\*sin(th4)) - 0.0018446125\*cos(th3)\*cos(th4) +  
0.0018446125\*sin(th3)\*sin(th4) +  
0.000022093999999999999866797093488579\*cos(th6)\*(cos(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) - 1.0\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) +  
0.00071794964000000000000000239404545\*cos(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3)) -  
0.000715299999999999987689291991443952\*sin(th6)\*(cos(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) - 1.0\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) -  
sin(conj(th6))\*(cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) +  
sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.000022093999999999999866797093488579\*cos(th6)\*(cos(th5)  
)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) +  
cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
sin(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) -  
cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)))) -  
0.000715299999999999987689291991443952\*sin(th6)\*(cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2)  
+ cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -

## Appendix Group 5

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sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0) +
dth1^2*(3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000700000000000000003842723519198948*cos(th1)*sin
(th2) + 0.0000000007000000000000000000003842723519198948*cos(th2)*sin(th1) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000810849999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)))
+ cos(conj(th2))*sin(conj(th1))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
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## Appendix Group 5

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0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
dth2^2*(3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.00000000070000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
1.0*ddth1*((0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.609125*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000070000000000000003842723519198948*cos(th1)*cos
(th2) - 0.00000000070000000000000003842723519198948*sin(th1)*sin(th2) +
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
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## Appendix Group 5

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0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*cos(sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) - 0.0000000002899999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000002899999999999999998083853395786991*cos(th1)*sin(th2)
) + 0.000000000289999999999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
```





## Appendix Group 5

0.000276590000000000000642555453289617\*cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
0.0000000003599999999999999760595454820992\*cos(th6)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.000276590000000000000642555453289617\*sin(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
0.00000000071000000000000002974426921534571\*sin(th6)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)))  
- (1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.002206234999999999969575423411061\*cos(th5)\*(cos(th3)\*  
sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1))) - 0.0043237989999999999907322051351244\*cos(th1)\*cos(th2) +  
0.0000000004700000000000000313402995165391\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.0043237989999999999907322051351244\*sin(th1)\*sin(th2) -  
0.0000000004700000000000000313402995165391\*cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.0022062349999999999969575423411061\*sin(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.0100115785\*cos(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.0087624425\*cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.0087624425\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
1.0\*(0.21325\*cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
0.21325\*cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.0807\*sin(th1)\*sin(th2) - 0.0807\*cos(th1)\*cos(th2) +  
0.609125\*cos(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.79875\*cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) -  
0.79875\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) + cos(conj(th2))\*sin(conj(th1)))  
- 1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.00000000070000000000000003842723519198948\*cos(th1)\*sin(th2)  
) + 0.00000000070000000000000003842723519198948\*cos(th2)\*sin(th1) +  
0.000000011630000000000000577510349925817\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) -  
0.000000011630000000000000577510349925817\*cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) -  
0.00081084999999999837760888965476624\*cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) -  
0.00081084999999999837760888965476624\*cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + (cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) + cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2))  
+ cos(conj(th2))\*sin(conj(th1))))\*(0.06471953125\*cos(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + 0.0095135312499999999363842206889785\*cos(th1)\*sin(th2) +  
0.0095135312499999999363842206889785\*cos(th2)\*sin(th1) -  
0.10291838125000000525588461641746\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.10291838125000000525588461641746\*cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.000000011630000000000000577510349925817\*cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.000000011630000000000000577510349925817\*cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
sin(conj(th6))\*(cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) +  
sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.000952365\*cos(th1)\*cos(th2) +  
0.0007179496400000000000000239404545\*cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.00071529999999999987689291991443952\*cos(th6)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) +  
0.000022093999999999998866797093488579\*sin(th6)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) -  
0.000952365\*sin(th1)\*sin(th2) -  
0.000022093999999999998866797093488579\*cos(th6)\*(1.0\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin

## Appendix Group 5

```
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) + (0.000022093999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + (0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

```
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) - 1.0) -
1.0*ddth2*((0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.000000007100000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000007100000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000035999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000007000000000000003842723519198948*cos(th1)*cos
(th2) - 0.000000000700000000000000003842723519198948*sin(th1)*sin(th2) +
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.10618*cos(th1)*cos(th2) + 0.10618*sin(th1)*sin(th2) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) - 0.00000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.000000002899999999999998083853395786991*cos(th1)*sin(th2)
) + 0.00000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
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## Appendix Group 5

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) * cos(th2) - 1.0 * sin(th1) * sin(th2)) + cos(th4) * sin(th3) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2))) + cos(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) - cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2))) +
0.000276590000000000000642555453289617 * cos(th5) * (cos(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) + cos(th4) * sin(th3) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2))) +
0.00000000035999999999999999760595454820992 * cos(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) -
0.000276590000000000000642555453289617 * sin(th5) * (1.0 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) - cos(th3) * cos(th4) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2))) +
0.000000000710000000000000002974426921534571 * sin(th6) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)))
- (1.0 * sin(conj(th5)) * (cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) +
cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) -
cos(conj(th5)) * (cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) -
1.0 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) * (0.0022062349999999999669575423411061 * cos(th5) * (cos(th3) *
sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) + cos(th4) * sin(th3) * (cos(th1) * sin(th2) +
cos(th2) * sin(th1))) - 0.0043237989999999999907322051351244 * cos(th1) * cos(th2) +
0.00000000047000000000000000313402995165391 * sin(th5) * (cos(th3) * sin(th4) * (cos(th1) * sin(th2) +
cos(th2) * sin(th1)) + cos(th4) * sin(th3) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) +
0.0043237989999999999907322051351244 * sin(th1) * sin(th2) -
0.00000000047000000000000000313402995165391 * cos(th5) * (cos(th3) * cos(th4) * (cos(th1) * sin(th2) +
cos(th2) * sin(th1)) - 1.0 * sin(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) +
0.0022062349999999999669575423411061 * sin(th5) * (cos(th3) * cos(th4) * (cos(th1) * sin(th2) +
cos(th2) * sin(th1)) - 1.0 * sin(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) +
0.0100115785 * cos(th3) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) +
0.0087624425 * cos(th3) * cos(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) -
0.0087624425 * sin(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) -
1.0 * (0.21325 * cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2))) +
0.21325 * cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) * (0.0807 * sin(th1) * sin(th2) - 0.0807 * cos(th1) * cos(th2) +
0.609125 * cos(th3) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) +
0.79875 * cos(th3) * cos(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1)) -
0.79875 * sin(th3) * sin(th4) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) +
(cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) + cos(conj(th2)) * sin(conj(th1)))
- 1.0 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +
cos(conj(th2)) * sin(conj(th1)))) * (0.00000000070000000000000003842723519198948 * cos(th1) * sin(th2)
) + 0.00000000070000000000000003842723519198948 * cos(th2) * sin(th1) +
0.0000000116300000000000000577510349925817 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) -
0.0000000116300000000000000577510349925817 * cos(th3) * cos(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) -
0.000810849999999999837760888965476624 * cos(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) -
0.000810849999999999837760888965476624 * cos(th4) * sin(th3) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) + (cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * sin(conj(th2)) +
cos(conj(th2)) * sin(conj(th1))) + cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * sin(conj(th2))
+ cos(conj(th2)) * sin(conj(th1)))) * (0.06471953125 * cos(th3) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) + 0.0095135312499999999363842206889785 * cos(th1) * sin(th2) +
0.0095135312499999999363842206889785 * cos(th2) * sin(th1) -
0.10291838125000000525588461641746 * sin(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) +
0.10291838125000000525588461641746 * cos(th3) * cos(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) +
0.0000000116300000000000000577510349925817 * cos(th3) * sin(th4) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2)) +
0.0000000116300000000000000577510349925817 * cos(th4) * sin(th3) * (cos(th1) * cos(th2) -
1.0 * sin(th1) * sin(th2))) +
sin(conj(th6)) * (cos(conj(th5)) * (cos(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2))) +
cos(conj(th4)) * sin(conj(th3)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) +
sin(conj(th5)) * (cos(conj(th3)) * cos(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2))) -
1.0 * sin(conj(th3)) * sin(conj(th4)) * (cos(conj(th1)) * cos(conj(th2)) -
1.0 * sin(conj(th1)) * sin(conj(th2)))) * (0.000952365 * cos(th1) * cos(th2) +
0.000717949640000000000000000239404545 * cos(th5) * (cos(th3) * sin(th4) * (cos(th1) * sin(th2) +
cos(th2) * sin(th1)) + cos(th4) * sin(th3) * (cos(th1) * sin(th2) + cos(th2) * sin(th1))) +
0.00071529999999999987689291991443952 * cos(th6) * (cos(th1) * cos(th2) - 1.0 * sin(th1) * sin(th2)) +
```

## Appendix Group 5

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0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th1
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3))) +
1.0*dth5^2*(2.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(0.04109*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.04109*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.04109*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
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## Appendix Group 5

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cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.002206234999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
1.0*dth3^2*(3.0*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th4) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000116300000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.609125*sin(th3) + 0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3)) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000116300000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.06471953125*sin(th3) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4) +
0.10291838125000000525588461641746*cos(th3)*sin(th4) +
0.10291838125000000525588461641746*cos(th4)*sin(th3) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.06471953125*cos(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0449298*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.4030929*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
dth6^2*((0.00458*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00865*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000003599999999999999760595454820992*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000000071000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

```
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00458*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000071000000000000002974426921534571*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000000000359999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000000359999999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000071000000000000002974426921534571*cos(th6)*(sin(th5
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) -
0.000000000359999999999999760595454820992*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
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[illegible]

## Appendix Group 5

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1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + ddth3*((cos(conj(th3))*sin(conj(th4))
+ cos(conj(th4))*sin(conj(th3)))*(0.000000011630000000000000577510349925817*cos(th3)*cos(th4)
+ 0.00081084999999999837760888965476624*cos(th3)*sin(th4) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.002206234999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.24365*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.04109*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.21325*cos(conj(th3))*cos(conj(th4)) -
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## Appendix Group 5

0.21325\*sin(conj(th3))\*sin(conj(th4))\*(0.24365\*cos(th3) + 0.21325\*cos(th3)\*cos(th4) +  
0.04109\*sin(th5)\*(cos(th3)\*cos(th4) - 1.0\*sin(th3)\*sin(th4)) - 0.21325\*sin(th3)\*sin(th4) +  
0.04109\*cos(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) +  
(0.21325\*cos(conj(th3))\*cos(conj(th4)) -  
0.21325\*sin(conj(th3))\*sin(conj(th4)))\*(0.609125\*cos(th3) + 0.79875\*cos(th3)\*cos(th4) -  
0.79875\*sin(th3)\*sin(th4)) + (sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4)) -  
1.0\*sin(conj(th3))\*sin(conj(th4))) + cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4)) +  
cos(conj(th4))\*sin(conj(th3)))\*(0.0100115785\*cos(th3) + 0.0087624425\*cos(th3)\*cos(th4) -  
0.0000000004700000000000000313402995165391\*cos(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) + 0.0022062349999999999669575423411061\*sin(th5)\*(cos(th3)\*cos(th4) -  
1.0\*sin(th3)\*sin(th4)) - 0.0087624425\*sin(th3)\*sin(th4) +  
0.0022062349999999999669575423411061\*cos(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3)) +  
0.0000000004700000000000000313402995165391\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) -  
1.0\*(cos(conj(th5))\*(cos(conj(th3))\*cos(conj(th4)) - 1.0\*sin(conj(th3))\*sin(conj(th4))) -  
1.0\*sin(conj(th5))\*(cos(conj(th3))\*sin(conj(th4)) +  
cos(conj(th4))\*sin(conj(th3)))\*(0.0000000004700000000000000313402995165391\*sin(th5)\*(cos(th3)  
\*cos(th4) - 1.0\*sin(th3)\*sin(th4)) -  
0.00032156500000000021871615629720509\*cos(th5)\*(cos(th3)\*cos(th4) - 1.0\*sin(th3)\*sin(th4)) +  
0.0000000004700000000000000313402995165391\*cos(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3)) +  
0.00032156500000000021871615629720509\*sin(th5)\*(cos(th3)\*sin(th4) + cos(th4)\*sin(th3))) -  
1.0\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))\*(0.0008108499999999837760888965476624\*sin(th3)\*sin(th4)\*(  
cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) -  
0.0008108499999999837760888965476624\*cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.000000011630000000000000577510349925817\*cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
0.000000011630000000000000577510349925817\*cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) +  
(0.21325\*cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) +  
0.21325\*cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1)))\*(0.609125\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.79875\*cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) +  
0.79875\*cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
(cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) + cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*sin(conj(th2))  
+ cos(conj(th2))\*sin(conj(th1)))) +  
sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*sin(conj(th2)) +  
cos(conj(th2))\*sin(conj(th1))))\*(0.00032156500000000021871615629720509\*cos(th5)\*(cos(th3)\*sin  
(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1))) -  
0.0000000004700000000000000313402995165391\*sin(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) + cos(th4)\*sin(th3)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.0000000004700000000000000313402995165391\*cos(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) +  
0.00032156500000000021871615629720509\*sin(th5)\*(cos(th3)\*cos(th4)\*(cos(th1)\*sin(th2) +  
cos(th2)\*sin(th1)) - 1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*sin(th2) + cos(th2)\*sin(th1))) -  
(cos(conj(th5))\*(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2)))) +  
sin(conj(th5))\*(cos(conj(th3))\*cos(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) -  
1.0\*sin(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))))\*(0.0000000004700000000000000313402995165391\*sin(th5)\*(cos  
(th3)\*sin(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2)) +  
cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) -  
0.00032156500000000021871615629720509\*cos(th5)\*(cos(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) + cos(th4)\*sin(th3)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
0.0000000004700000000000000313402995165391\*cos(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2)  
- 1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
0.00032156500000000021871615629720509\*sin(th5)\*(1.0\*sin(th3)\*sin(th4)\*(cos(th1)\*cos(th2) -  
1.0\*sin(th1)\*sin(th2)) - cos(th3)\*cos(th4)\*(cos(th1)\*cos(th2) - 1.0\*sin(th1)\*sin(th2))) +  
(cos(conj(th3))\*sin(conj(th4))\*(cos(conj(th1))\*cos(conj(th2)) -  
1.0\*sin(conj(th1))\*sin(conj(th2))) +  
cos(conj(th4))\*sin(conj(th3))\*(cos(conj(th1))\*cos(conj(th2)) -



## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + (cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.06471953125*cos(th3) +
0.10291838125000000525588461641746*cos(th3)*cos(th4) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000007100000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00000000359999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000359999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000007100000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00027659000000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(t
h2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
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## Appendix Group 5

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1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999969575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.04109*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.04109*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.24365*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000276590000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.000000000710000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
+ 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) + cos(conj(th4))*sin(conj(th3))) -
0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.24365*cos(th3) + 0.21325*cos(th3)*cos(th4) -
0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 0.21325*sin(th3)*sin(th4) +
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000717949640000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) - 0.0021075725*cos(th3) +
0.0018446125*sin(th3)*sin(th4) +
0.0000220939999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

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0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0003801407100000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) - 0.001115917*cos(th3) +
0.000976685*sin(th3)*sin(th4) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) + 1.0) +
ddth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000710000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(0.00865*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) - 1.0*(0.00458*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(
conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00458*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + 0.00865*sin(th6)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000003599999999999999760595454820992*cos(th6)*(1.
0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000000035999999999999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.000000003599999999999999999999760595454820992*cos(th6)*(sin(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00000000071000000000000002974426921534571*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
```

## Appendix Group 5

```
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*cos(conj(th6))*(0.000022093999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th
4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0003625*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) +
sin(conj(th6))*(0.00071529999999999987689291991443952*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000022093999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(
th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0)
+ 2.0*dth1*dth5*(2.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
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[illegible]

[illegible]



## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(
th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0022062349999999999669575423411061*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*dth1*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0008108499999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000116300000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0008108499999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0008108499999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1))))*(0.0000000116300000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000116300000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
2.0*dth2*dth4*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0008108499999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0008108499999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
```

## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos
(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(
cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + 3.0*(0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
2.0*dth1*dth2*(3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0807*sin(th1)*sin(th2) - 0.0807*cos(th1)*cos(th2) +
0.609125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000000070000000000000003842723519198948*cos(th1)*sin
(th2) + 0.0000000007000000000000000003842723519198948*cos(th2)*sin(th1) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0095135312499999999363842206889785*cos(th1)*sin(th2) +
0.0095135312499999999363842206889785*cos(th2)*sin(th1) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
```

## Appendix Group 5

```
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.609125*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.0807*cos(th1)*sin(th2) + 0.0807*cos(th2)*sin(th1) -
0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))))*(0.0095135312499999999363842206889785*sin(th1)*sin(th2) -
0.0095135312499999999363842206889785*cos(th1)*cos(th2) +
0.06471953125*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000070000000000000003842723519198948*cos(th1)*cos(th2)
) - 0.000000000700000000000000000003842723519198948*sin(th1)*sin(th2) +
0.00000001163000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 2.0*dth3*dth4*(3.0*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.00000011630000000000000577510349925817*cos(th3)*sin(th4) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)) +
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4)))*(0.10291838125000000525588461641746*cos(th3)*sin(th4) -
0.00000001163000000000000577510349925817*cos(th3)*cos(th4) +
0.10291838125000000525588461641746*cos(th4)*sin(th3) +
0.00000001163000000000000577510349925817*sin(th3)*sin(th4)) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos
(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000001163000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.79875*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.79875*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
3.0*(0.79875*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.79875*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
```

## Appendix Group 5

```
3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.00000011630000000000000577510349925817*cos(th3)*cos(th
4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00081084999999999837760888965476624*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - 3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+
cos(conj(th2))*sin(conj(th1)))*(0.10291838125000000525588461641746*cos(th3)*cos(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.0000000116300000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 0.10291838125000000525588461641746*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 3.0*(0.21325*cos(conj(th3))*cos(conj(th4)) -
0.21325*sin(conj(th3))*sin(conj(th4)))*(0.79875*cos(th3)*sin(th4) +
0.79875*cos(th4)*sin(th3))) -
2.0*dth1*dth3*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
```

## Appendix Group 5

```
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
2.0*dth2*dth3*(3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(
th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.609125*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))*(0.06471953125*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) -
3.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.609125*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.79875*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.79875*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
3.0*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.06471953125*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) -
0.000000011630000000000000577510349925817*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + 0.10291838125000000525588461641746*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 3.0*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))*(0.000000011630000000000000577510349925817*cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00081084999999999837760888965476624*cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.000000011630000000000000577510349925817*cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) +
0.00081084999999999837760888965476624*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
2.0*dth3*dth5*(2.0*(0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.04109*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.04109*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
```

[illegible]



## Appendix Group 5

```
- 1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth1*dth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000000007100000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000007100000000000000002974426921534571*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
- 1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000007100000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
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[illegible]

[illegible]

[illegible]

## Appendix Group 5

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sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0007152999999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0007152999999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007152999999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth3*dth6*((sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
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## Appendix Group 5

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0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000003599999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*cos(conj(th6))*(0.000022093999999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

[illegible]



[illegible]



## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000715299999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth5*dth6*((sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)
*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
0.21325*cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
0.21325*cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) - 1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))) - 0.21325*cos(conj(th3))*cos(conj(th4)) +
0.21325*sin(conj(th3))*sin(conj(th4))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th6))*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(c
os(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(c
onj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))))))
```

T5=

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-
1.0*dthl^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000000289999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000289999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000289999999999999998083853395786991*cos(th1)*sin
(th2) + 0.000000000289999999999999998083853395786991*cos(th2)*sin(th1) +
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003215650000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) - 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) + 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000004700000000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.0000000000470000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.24365*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000004700000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000000002974426921534571*cos(th6)*(cos(th
```

[illegible]

## Appendix Group 5

```
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000276590000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007179496400000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) - 0.0021075725*cos(th3) +
0.0018446125*sin(th3)*sin(th4) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(co
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## Appendix Group 5

```
cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) -
1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4)))
+ 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.083*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
0.00458*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) + 0.083*cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)) - 0.00865*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin
(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000047000000000000000313402995165391*sin(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00000000035999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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[illegible]



## Appendix Group 5

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cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999999866797093488579*cos(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
1.0) - 1.0*dth5^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
ddth1*((0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000276590000000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.0000000007100000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000007100000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
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## Appendix Group 5

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cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 1.0) +
ddth2*((0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.1101*cos(th1)*cos(th2) +
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) - 0.1101*sin(th1)*sin(th2) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.083*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.24365*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.21325*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00027659000000000000642555453289617*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) -
0.000000000710000000000000002974426921534571*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.000000000710000000000000002974426921534571*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.24365*cos(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.1101*cos(th1)*sin(th2) + 0.1101*cos(th2)*sin(th1) -
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
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## Appendix Group 5

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+ cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00865*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.083*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00458*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.21325*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) - 0.00000000028999999999999998083853395786991*cos(th1)*cos(th2) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000028999999999999998083853395786991*sin(th1)*sin(th2) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000002899999999999998083853395786991*cos(th1)*sin(th2)
) + 0.00000000028999999999999998083853395786991*cos(th2)*sin(th1) +
0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000047000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.004323798999999999907322051351244*cos(th1)*sin(th2) +
0.004323798999999999907322051351244*cos(th2)*sin(th1) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000047000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(1.0*si
n(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000000003599999999999999760595454820992*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00027659000000000000642555453289617*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000003599999999999999760595454820992*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.00027659000000000000642555453289617*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ 1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.0043237989999999999907322051351244*cos(th1)*cos(th2) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0043237989999999999907322051351244*sin(th1)*sin(th2) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000952365*cos(th1)*cos(th2) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0005042258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
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## Appendix Group 5

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0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000002974426921534571*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000003599999999999999760595454820992*sin(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0002765900000000000642555453289617*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0002765900000000000642555453289617*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0087624425*cos(th3)*cos(th4) -
0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + 0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 0.0087624425*sin(th3)*sin(th4) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos(th3
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00458*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*
cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00865*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.083*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.083*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.21325*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.21325*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00027659000000000000642555453289617*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00000000071000000000000002974426921534571*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0002765900000000000642555453289617*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
1.0*cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) + 0.000976685*sin(th3)*sin(th4)
- 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(co
s(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
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## Appendix Group 5

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0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) +
0.0018446125*sin(th3)*sin(th4) +
0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.0007152999999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*si
n(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00002209399999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) - 1.0) +
dth6^2*((0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00865*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
- 0.00458*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00458*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00865*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
```

## Appendix Group 5

[illegible]

[illegible]

## Appendix Group 5

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(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0449298*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*dth4^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(t
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## Appendix Group 5

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h4) - 1.0*sin(th3)*sin(th4)) - 0.0087624425*cos(th3)*sin(th4) - 0.0087624425*cos(th4)*sin(th3)
+ 0.000000000470000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999999969575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00000000047000000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.4030929*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
ddth6*((1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000071000000000000000002974426921534571*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00458*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.00865*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00865*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00458*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(0.00865*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
sin(conj(th6))*(0.0007152999999999987689291991443952*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0000220939999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) -
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin
(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0007152999999999987689291991443952*cos(th6)*(1.0*sin(
th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007152999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + 1.0)
+ 0.0848565*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
1.0*dth3^2*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000047000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0022062349999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
```

## Appendix Group 5

```
0.0100115785*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0100115785*sin(th3) -
0.0022062349999999999999669575423411061*cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.0087624425*cos(th3)*sin(th4) + 0.0087624425*cos(th4)*sin(th3) -
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) -
0.0000000004700000000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0022062349999999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0100115785*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0022062349999999999999669575423411061*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0022062349999999999999669575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*dth1*dth2*(2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) - 0.000000000289999999999999999998083853395786991*cos(th1)*cos(th2) +
```





[illegible]

## Appendix Group 5

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0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00032156500000000021871615629720509*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000004700000000000000313402995165391*sin(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2))) -
0.00032156500000000021871615629720509*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000000000470000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000004700000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) -
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0087624425*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth1*dth6*(1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000710000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00000000035999999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.00000000035999999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000710000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
```

[illegible]

## Appendix Group 5

```
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th1)
)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth2*dth6*(1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj
(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000071000000000000002974426921534571*cos(th6)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0000000003599999999999999760595454820992*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000000003599999999999999760595454820992*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)
)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
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[illegible]

## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)
)*sin(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000022093999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
cos(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000022093999999999999998866797093488579*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000022093999999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(conj(th6))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000022093999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth3*dth5*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)
)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00000000047000000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
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## Appendix Group 5

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cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000321565000000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000000004700000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*
sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000000004700000000000000000313402995165391*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.002206234999999999969575423411061*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.002206234999999999969575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.0000000004700000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.002206234999999999969575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
2.0*dth4*dth5*(2.0*(cos(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) - 1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00000000047000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000047000000000000000313402995165391*cos(th5)*(cos(th3)
*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000321565000000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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[illegible]

[illegible]

[illegible]

## Appendix Group 5

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1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)
)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000321565000000000021871615629720509*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000000000470000000000000000313402995165391*cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00032156500000000021871615629720509*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000000000470000000000000000313402995165391*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2)
- 1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
2.0*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) - 1.0*sin(conj(th3))*sin(conj(th4))) +
cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*cos(t
h4) - 1.0*sin(th3)*sin(th4)) - 0.0087624425*cos(th3)*sin(th4) - 0.0087624425*cos(th4)*sin(th3)
+ 0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) +
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0022062349999999999669575423411061*cos(th5)*(cos(th3)*sin(
th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) +
0.000000000470000000000000000313402995165391*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000000000470000000000000000313402995165391*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00220623499999999999669575423411061*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0087624425*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0087624425*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth3*dth6*((0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin
(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- 0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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## Appendix Group 5

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cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000000035999999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000000035999999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000000035999999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3)))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
1.0*cos(conj(th6))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th2)*sin(th1))))*(cos(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(
th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
+ sin(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*cos(conj(th6))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
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[illegible]

## Appendix Group 5

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cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.00865*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)))))*(0.083*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))
*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
0.083*cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) - (sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th5)
)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) -
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) + cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2))
+ cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00000000035999999999999999760595454820992*cos(th6)*(cos(th
5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
1.0*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00000000035999999999999999760595454820992*cos(th6)*(co
s(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00000000071000000000000002974426921534571*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1))*co
s(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(0.00865*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00458*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) -
1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))))*(0.083*sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + 0.083*cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3)))) +
1.0*cos(conj(th6))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th
4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
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[illegible]



## Appendix Group 5

[illegible]

[illegible]



[illegible]

T6=

[illegible]

## Appendix Group 5

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+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00002209399999999999998866797093488579*cos(th6)*(sin(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00071529999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00002209399999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
dth1^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
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## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.00038014071000000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00038014071000000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
dth2^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
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## Appendix Group 5

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cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) +
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(con
j(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.0000220939999999999998866797093488579*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
```



## Appendix Group 5

```
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0848565*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0449298*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
ddth4*((1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))
+
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*s
in(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
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## Appendix Group 5

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n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0018446125*cos(th3)*sin(th4) +
0.0018446125*cos(th4)*sin(th3)) -
0.0000220939999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000715299999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.000976685*cos(th3)*sin(th4) + 0.000976685*cos(th4)*sin(th3)
+ 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0000220939999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
dth5^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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## Appendix Group 5

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0.0003801407100000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.00022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00022093999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000715299999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0007179496400000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00022093999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
dth3^2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007179496400000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.00022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
```







## Appendix Group 5

```
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.0018446125*cos(th3)*cos(th4) - 0.0021075725*cos(th3) +
0.0018446125*sin(th3)*sin(th4) +
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) -
0.000715299999999999987689291991443952*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) - 0.000976685*cos(th3)*cos(th4) - 0.001115917*cos(th3) +
0.000976685*sin(th3)*sin(th4) - 0.0003625*cos(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) + 1.0) +
ddth1*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
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## Appendix Group 5

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sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2))
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.000022093999999999998866797093488579*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00002209399999999999999999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00002209399999999999999999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2) -
0.00002209399999999999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999999999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007179496400000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999999999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000715299999999999999999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071529999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0007179496400000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.001115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00038014071000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) + 1.0) +
ddth2*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th
1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))
+ 0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
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[illegible]

## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
2.0*dth2*dth3*((1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) - sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000022093999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.001115917*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
```

## Appendix Group 5

```
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(c
os(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th2)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0021075725*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.00071794964000000000000000239404545*cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0007152999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0021075725*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th
1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))
+ sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth1*dth5*(1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
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[illegible]

[illegible]

[illegible]

## Appendix Group 5

```
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2))
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3))*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999999866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth2*dth6*((cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
-
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - 0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) +
0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999999866797093488579*cos(th6)*(1.0*sin(th
5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3))*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0003625*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0000220939999999999999866797093488579*cos(th6)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) -
0.00071529999999999987689291991443952*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.00071529999999999987689291991443952*cos(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999999866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3))*sin(th4)*(cos(th1)*sin
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## Appendix Group 5

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(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
1.0*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999987689291991443952*cos(th6)*(1.0*sin(th5)
)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000715299999999999987689291991443952*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth1*dth2*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000952365*cos(th1)*cos(th2) +
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000715299999999999987689291991443952*cos(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000952365*sin(th1)*sin(th2)) -
0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000715299999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0021075725*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.00115917*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000504258*cos(th1)*sin(th2) + 0.000504258*cos(th2)*sin(th1) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0000220939999999999998866797093488579*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0003801407100000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
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0.0003625*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))*(0.0021075725*cos(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + 0.000952365*cos(th1)*sin(th2) + 0.000952365*cos(th2)*sin(th1) +
0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007152999999999999987689291991443952*cos(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000717949640000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00002209399999999999998866797093488579*sin(th6)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(cos(th1)*c
os(th2) - 1.0*sin(th1)*sin(th2)) -
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000504258*cos(th1)*cos(th2) + 0.0003625*sin(th6)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.000504258*sin(th1)*sin(th2) -
0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.001115917*cos(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
2.0*dth3*dth6*((0.00002209399999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
cos(th2)*sin(th1))))*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))
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## Appendix Group 5

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cos(conj(th2))*sin(conj(th1)))))) -
(0.0000220939999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th
2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
(0.0007152999999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))))*(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
(0.0007152999999999999987689291991443952*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2)
) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))))*(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(
cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) +
1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th2))*sin(conj(th1))) +
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007152999999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000220939999999999999866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth4*dth6*((0.0000220939999999999999866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(
cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.0003625*sin(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
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[illegible]



[illegible]

## Appendix Group 5

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1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) +
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0007152999999999987689291991443952*cos(th6)*(cos(th5)*(cos
(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) +
0.0000220939999999999998866797093488579*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
1.0*sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0000220939999999999998866797093488579*cos(th6)*(cos(th5)*(co
s(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) - 1.0*sin(th5)*(cos(th3)*sin(th4) +
cos(th4)*sin(th3))) + 0.0003625*sin(th6)*(cos(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4))
- 1.0*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))) +
2.0*dth3*dth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4)))*(cos(conj(th
1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0000220939999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0007152999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00038014071000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.00038014071000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000976685*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.000976685*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(co
s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
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## Appendix Group 5

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1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0000220939999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0003801407100000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.000976685*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
0.000976685*cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
(sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071794964000000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000022093999999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.0018446125*cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) +
0.0018446125*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000717949640000000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0018446125*cos(th3)*sin(th4) +
0.0018446125*cos(th4)*sin(th3)) -
0.000022093999999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0007152999999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0003801407100000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.000976685*cos(th3)*sin(th4) + 0.000976685*cos(th4)*sin(th3)
+ 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) - 1.0*sin(th3)*sin(th4)) +
cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000022093999999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0003801407100000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
2.0*dth1*dth4*((cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th
1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0007152999999999999987689291991443952*sin(th6)*(cos(th5)*(cos
(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th4)*sin(th3)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1))) + sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000022093999999999999998866797093488579*cos(th6)*(cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2)
+ cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
0.000717949640000000000000000239404545*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) +
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## Appendix Group 5

[illegible]

## Appendix Group 5

[illegible]

[illegible]

## Appendix Group 5

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cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007179496400000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.0007179496400000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.000022093999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.000022093999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.00071529999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000022093999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.0003801407100000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
2.0*dth4*dth5*((sin(conj(th6))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) -
0.000022093999999999998866797093488579*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071529999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(
th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
1.0*(cos(conj(th6))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))) -
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)
)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2))))*(0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(co
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## Appendix Group 5

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s(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos
(th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2))) + cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
0.000380140710000000000000002974426922*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) -
0.000380140710000000000000002974426922*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
(cos(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th
2)) - 1.0*sin(conj(th1))*sin(conj(th2)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*cos(conj(th2)) -
1.0*sin(conj(th1))*sin(conj(th2)))) + 1.0*sin(conj(th6))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.00002209399999999999998866797093488579*cos(th6)*(1.0*sin(th5)
*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) +
cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.0007152999999999999987689291991443952*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(
th2) - 1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))
+ cos(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)) -
cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) -
0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) + cos(th4)*sin(th3)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2))) +
0.00071794964000000000000000239404545*sin(th5)*(1.0*sin(th3)*sin(th4)*(cos(th1)*cos(th2) -
1.0*sin(th1)*sin(th2)) - cos(th3)*cos(th4)*(cos(th1)*cos(th2) - 1.0*sin(th1)*sin(th2)))) +
1.0*(1.0*cos(conj(th6))*(cos(conj(th1))*cos(conj(th2)) - 1.0*sin(conj(th1))*sin(conj(th2))) +
sin(conj(th6))*(1.0*sin(conj(th5))*(cos(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)
)) + cos(conj(th2))*sin(conj(th1)))) +
cos(conj(th4))*sin(conj(th3))*(cos(conj(th1))*sin(conj(th2)) + cos(conj(th2))*sin(conj(th1))))
- cos(conj(th5))*(cos(conj(th3))*cos(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1)))) -
1.0*sin(conj(th3))*sin(conj(th4))*(cos(conj(th1))*sin(conj(th2)) +
cos(conj(th2))*sin(conj(th1))))*(0.0003801407100000000000002974426922*cos(th5)*(cos(th3)*si
n(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1))) + 0.0003625*cos(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
0.00002209399999999999998866797093488579*sin(th6)*(1.0*sin(th5)*(cos(th3)*sin(th4)*(cos(th1)*sin
(th2) + cos(th2)*sin(th1)) + cos(th4)*sin(th3)*(cos(th1)*sin(th2) + cos(th2)*sin(th1))) -
cos(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)) -
1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) +
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*cos(th4)*(cos(th1)*sin(th2) +
cos(th2)*sin(th1)) - 1.0*sin(th3)*sin(th4)*(cos(th1)*sin(th2) + cos(th2)*sin(th1)))) -
cos(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.00071794964000000000000000239404545*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) -
0.00002209399999999999998866797093488579*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
0.0007152999999999999987689291991443952*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00071794964000000000000000239404545*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) +
sin(conj(th6))*(sin(conj(th5))*(cos(conj(th3))*cos(conj(th4)) -
1.0*sin(conj(th3))*sin(conj(th4))) + cos(conj(th5))*(cos(conj(th3))*sin(conj(th4)) +
cos(conj(th4))*sin(conj(th3))))*(0.0003801407100000000000002974426922*cos(th5)*(cos(th3)*cos(
th4) - 1.0*sin(th3)*sin(th4)) + 0.0003625*cos(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.00002209399999999999998866797093488579*sin(th6)*(sin(th5)*(cos(th3)*cos(th4) -
1.0*sin(th3)*sin(th4)) + cos(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3))) -
0.000380140710000000000000002974426922*sin(th5)*(cos(th3)*sin(th4) + cos(th4)*sin(th3)))
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