```
So luong he truc toa do: 11

n =

    11

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

     1     1     0     1     0     0     1     0     0

Quay quanh tuc nao x/y/z: y

Q =

y

Gia tri quay quanh truc: t1

t =

t1


T =

[  cos(t1), 0, sin(t1), 0]
[        0, 1,       0, 0]
[ -sin(t1), 0, cos(t1), 0]
[        0, 0,       0, 1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

     1     0     0     1     0     0     1     0     0

Dich chuyen theo truc x : l1

dx =

l1

Dich chuyen theo truc y : 0

dy =

     0
```

```
Dich chuyen theo truc z : 0

dz =

     0


T =

[  cos(t1), 0, sin(t1),  l1*cos(t1)]
[        0, 1,       0,           0]
[ -sin(t1), 0, cos(t1), -l1*sin(t1)]
[        0, 0,       0,           1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

     1     0     0     1     0     0     1     0     0

Dich chuyen theo truc x : 0

dx =

     0

Dich chuyen theo truc y : l2

dy =

l2

Dich chuyen theo truc z : 0

dz =

     0


T =

[  cos(t1), 0, sin(t1),  l1*cos(t1)]
[        0, 1,       0,          l2]
[ -sin(t1), 0, cos(t1), -l1*sin(t1)]
[        0, 0,       0,           1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1
```

```
C =

     1     0     0     1     0     0     1     0     0

Quay quanh tuc nao x/y/z: z

Q =

z

Gia tri quay quanh truc: t2

t =

t2


T =

[  cos(t1)*cos(t2), -cos(t1)*sin(t2), sin(t1),  l1*cos(t1)]
[          sin(t2),          cos(t2),       0,          l2]
[ -cos(t2)*sin(t1),  sin(t1)*sin(t2), cos(t1), -l1*sin(t1)]
[                0,                0,       0,           1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

     1     0     0     1     0     0     1     0     0

Dich chuyen theo truc x : 0

dx =

     0

Dich chuyen theo truc y : l3

dy =

l3

Dich chuyen theo truc z : 0

dz =

     0
```

```
T =

[  cos(t1)*cos(t2), -cos(t1)*sin(t2), sin(t1), l1*cos(t1) - l3*cos(t1)*sin(t2)]
[          sin(t2),          cos(t2),       0,                 l2 + l3*cos(t2)]
[ -cos(t2)*sin(t1),  sin(t1)*sin(t2), cos(t1), l3*sin(t1)*sin(t2) - l1*sin(t1)]
[                0,                0,       0,                              1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

     1     0     0     1     0     1     1     0     0

Quay quanh tuc nao x/y/z: z

Q =

z

Gia tri quay quanh truc: t3

t =

t3


T =

[ cos(t1)*cos(t2)*cos(t3) - cos(t1)*sin(t2)*sin(t3), - cos(t1)*cos(t2)*sin(t3) - cos
(t1)*cos(t3)*sin(t2), sin(t1), l1*cos(t1) - l3*cos(t1)*sin(t2)]
[                 cos(t2)*sin(t3) + cos(t3)*sin(t2),                   cos(t2)*cos
(t3) - sin(t2)*sin(t3),       0,                 l2 + l3*cos(t2)]
[ sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1),   cos(t2)*sin(t1)*sin(t3) + cos
(t3)*sin(t1)*sin(t2), cos(t1), l3*sin(t1)*sin(t2) - l1*sin(t1)]
[                                                    0,
0,       0,                                1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

     1     0     0     1     0     1     0     0     0

Dich chuyen theo truc x : 0

dx =

     0
```

```
Dich chuyen theo truc y : l4

dy =

l4

Dich chuyen theo truc z : 0

dz =

     0


T =

[ cos(t1)*cos(t2)*cos(t3) - cos(t1)*sin(t2)*sin(t3), - cos(t1)*cos(t2)*sin(t3) - cos
(t1)*cos(t3)*sin(t2), sin(t1), l1*cos(t1) - l4*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos
(t3)*sin(t2)) - l3*cos(t1)*sin(t2)]
[                 cos(t2)*sin(t3) + cos(t3)*sin(t2),                  cos(t2)*cos
(t3) - sin(t2)*sin(t3),       0,                                  l2 + l4*(cos(t2)*cos
(t3) - sin(t2)*sin(t3)) + l3*cos(t2)]
[ sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1),   cos(t2)*sin(t1)*sin(t3) + cos
(t3)*sin(t1)*sin(t2), cos(t1), l4*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2))
- l1*sin(t1) + l3*sin(t1)*sin(t2)]
[                                                    0,
0,       0,
1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

     1     0     0     1     0     1     0     1     0

Quay quanh tuc nao x/y/z: z

Q =

z

Gia tri quay quanh truc: t4

t =

t4


T =
```

```
[ - cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - sin(t4)*(cos(t1↙
*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)), sin(t4)*(cos(t1)*sin(t2)*sin(t3) - co↙
(t1)*cos(t2)*cos(t3)) - cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))↙
sin(t1), l1*cos(t1) - l4*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)) - l3*co↙
(t1)*sin(t2)]
[                                  cos(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + si↙
(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)),                                  cos(t4)↙
(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2))↙
0,                                 l2 + l4*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) ↙
l3*cos(t2)]
[   cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)*(cos(t2↙
*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)), cos(t4)*(cos(t2)*sin(t1)*sin(t3) + co↙
(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1))↙
cos(t1), l4*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - l1*sin(t1) + l3*si↙
(t1)*sin(t2)]
[↙
0,↙
0,       0,↙
1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

     1     0     0     1     0     1     0     1     0

Dich chuyen theo truc x : 0

dx =

     0

Dich chuyen theo truc y : l5

dy =

l5

Dich chuyen theo truc z : 0

dz =

     0


T =

[ - cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - sin(t4)*(cos(t1↙
*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)), sin(t4)*(cos(t1)*sin(t2)*sin(t3) - co↙
```

```
(t1)*cos(t2)*cos(t3)) - cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))↙
sin(t1), l1*cos(t1) - l5*(cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))↙
- sin(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3))) - l4*(cos(t1)*cos(t2)↙
*sin(t3) + cos(t1)*cos(t3)*sin(t2)) - l3*cos(t1)*sin(t2)]
[                                  cos(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + sin↙
(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)),                                    cos(t4)↙
(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2))↙
0,                                                                  l2 + l4*(cos(t2)↙
*cos(t3) - sin(t2)*sin(t3)) + l3*cos(t2) + l5*(cos(t4)*(cos(t2)*cos(t3) - sin(t2)*sin↙
(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)))]
[   cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)*(cos(t2)↙
*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)), cos(t4)*(cos(t2)*sin(t1)*sin(t3) + cos↙
(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1))↙
cos(t1), l4*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) + l5*(cos(t4)*(cos↙
(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) ↙
cos(t2)*cos(t3)*sin(t1))) - l1*sin(t1) + l3*sin(t1)*sin(t2)]
[↙
0,↙
0,       0,↙
1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

     1     0     0     1     0     1     0     1     0     1

Quay quanh tuc nao x/y/z: y

Q =

y

Gia tri quay quanh truc: t5

t =

t5


T =

[ - sin(t1)*sin(t5) - cos(t5)*(cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos↙
(t3)) + sin(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))), sin(t4)*(cos↙
(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - cos(t4)*(cos(t1)*cos(t2)*sin(t3) ↙
cos(t1)*cos(t3)*sin(t2)), cos(t5)*sin(t1) - sin(t5)*(cos(t4)*(cos(t1)*sin(t2)*sin(t3↙
- cos(t1)*cos(t2)*cos(t3)) + sin(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin↙
(t2))), l1*cos(t1) - l5*(cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))↙
- sin(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3))) - l4*(cos(t1)*cos(t2)↙
```

```
*sin(t3) + cos(t1)*cos(t3)*sin(t2)) - l3*cos(t1)*sin(t2)]
[                                                    cos(t5)*(cos(t4)*(cos(t2)*sin
(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3))),
cos(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin
(t2)),                                                    sin(t5)*(cos(t4)*(cos(t2
*sin(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3))),
l2 + l4*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) + l3*cos(t2) + l5*(cos(t4)*(cos(t2)*cos
(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)))]
[   cos(t5)*(cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)
(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2))) - cos(t1)*sin(t5), cos(t4)*(cos
(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3)
cos(t2)*cos(t3)*sin(t1)), cos(t1)*cos(t5) + sin(t5)*(cos(t4)*(sin(t1)*sin(t2)*sin(t3)
- cos(t2)*cos(t3)*sin(t1)) + sin(t4)*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin
(t2))), l4*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) + l5*(cos(t4)*(cos(t2)
*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos
(t2)*cos(t3)*sin(t1))) - l1*sin(t1) + l3*sin(t1)*sin(t2)]
[
0,
0,
0,
1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

  Columns 1 through 10

     1     0     0     1     0     1     0     1     0     1

  Column 11

     0

Dich chuyen theo truc x : l6

dx =

l6

Dich chuyen theo truc y : 0

dy =

     0

Dich chuyen theo truc z : 0

dz =
```

```
     0


T =

[ - sin(t1)*sin(t5) - cos(t5)*(cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos
(t3)) + sin(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))), sin(t4)*(cos
(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - cos(t4)*(cos(t1)*cos(t2)*sin(t3) +
cos(t1)*cos(t3)*sin(t2)), cos(t5)*sin(t1) - sin(t5)*(cos(t4)*(cos(t1)*sin(t2)*sin(t3)
- cos(t1)*cos(t2)*cos(t3)) + sin(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin
(t2))), l1*cos(t1) - l4*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)) - l5*(cos
(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)) - sin(t4)*(cos(t1)*sin(t2)
*sin(t3) - cos(t1)*cos(t2)*cos(t3))) - l6*(sin(t1)*sin(t5) + cos(t5)*(cos(t4)*(cos
(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) + sin(t4)*(cos(t1)*cos(t2)*sin(t3) +
cos(t1)*cos(t3)*sin(t2)))) - l3*cos(t1)*sin(t2)]
[                                                    cos(t5)*(cos(t4)*(cos(t2)*sin
(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3))),
cos(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin
(t2)),                                                       sin(t5)*(cos(t4)*(cos(t2)
*sin(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3))),
l2 + l4*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) + l3*cos(t2) + l5*(cos(t4)*(cos(t2)*cos
(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2))) + l6*cos(t5)
(cos(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin
(t3)))]
[   cos(t5)*(cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)
(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2))) - cos(t1)*sin(t5), cos(t4)*(cos
(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) -
cos(t2)*cos(t3)*sin(t1)), cos(t1)*cos(t5) + sin(t5)*(cos(t4)*(sin(t1)*sin(t2)*sin(t3)
- cos(t2)*cos(t3)*sin(t1)) + sin(t4)*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin
(t2))), l4*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - l6*(cos(t1)*sin(t5)
- cos(t5)*(cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)*(cos
(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)))) + l5*(cos(t4)*(cos(t2)*sin(t1)*sin
(t3) + cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)
*sin(t1))) - l1*sin(t1) + l3*sin(t1)*sin(t2)]
[
0,
0,
0,
1]


ans =

[   cos(t2 + t3 + t4)*cos(t1)*cos(t5) - sin(t1)*sin(t5), -sin(t2 + t3 + t4)*cos(t1)
cos(t5)*sin(t1) + cos(t2 + t3 + t4)*cos(t1)*sin(t5), l1*cos(t1) - l4*sin(t2 + t3)*cos
(t1) - l3*cos(t1)*sin(t2) - l6*sin(t1)*sin(t5) - l5*sin(t2 + t3 + t4)*cos(t1)
l6*cos(t2 + t3 + t4)*cos(t1)*cos(t5)]
[                            sin(t2 + t3 + t4)*cos(t5),          cos(t2 + t3 + t4)
```

```
sin(t2 + t3 + t4)*sin(t5),      l2 - l5*(sin(t2 + t3)*sin(t4) - cos(t2 + t3)*cos(t4)) ↙
+ l4*cos(t2 + t3) + l3*cos(t2) + l6*cos(t5)*(cos(t2 + t3)*sin(t4) + sin(t2 + t3)*cos ↙
(t4))]
[ - cos(t1)*sin(t5) - cos(t2 + t3 + t4)*cos(t5)*sin(t1),  sin(t2 + t3 + t4)*sin(t1) ↙
cos(t1)*cos(t5) - cos(t2 + t3 + t4)*sin(t1)*sin(t5),  l4*sin(t2 + t3)*sin(t1) ↙
l1*sin(t1) - l6*(cos(t1)*sin(t5) + cos(t2 + t3 + t4)*cos(t5)*sin(t1)) + l3*sin(t1) ↙
*sin(t2) + l5*sin(t2 + t3 + t4)*sin(t1)]
[                                                    0,                          0 ↙
0,↙
1]

>>
```