(a)

```
> restart;
> with(Student[Calculus1]);
```

$[$ *AntiderivativePlot, AntiderivativeTutor, ApproximateInt, ApproximateIntTutor, ArcLength,* **(1)**

    ArcLengthTutor, Asymptotes, Clear, CriticalPoints, CurveAnalysisTutor, DerivativePlot,

    DerivativeTutor, DiffTutor, Distance, ExtremePoints, FunctionAverage,

    FunctionAverageTutor, FunctionChart, FunctionPlot, GetMessage, GetNumProblems,

    GetProblem, Hint, InflectionPoints, IntTutor, Integrand, InversePlot, InverseTutor,

    LimitTutor, MeanValueTheorem, MeanValueTheoremTutor, NewtonQuotient,

    NewtonsMethod, NewtonsMethodTutor, PointInterpolation, RiemannSum, RollesTheorem,

    Roots, Rule, Show, ShowIncomplete, ShowSolution, ShowSteps, Summand,

    SurfaceOfRevolution, SurfaceOfRevolutionTutor, Tangent, TangentSecantTutor,

    TangentTutor, TaylorApproximation, TaylorApproximationTutor, Understand, Undo,

    VolumeOfRevolution, VolumeOfRevolutionTutor, WhatProblem $]$

```
> IO1:=Int(w(t)*pi[2*k](t)*pi[2*j](t),t=-a..a);
```

$$IO1 := \int_{-a}^{a} w(t)\,\pi_{2k}(t)\,\pi_{2j}(t)\;\mathrm{d}t \qquad\qquad (2)$$

```
> IO1b := 2*Int(w(t)*pip[k](t^2)*pip[j](t^2), t = 0..a);
```

$$IO1b := 2\left(\int_{0}^{a} w(t)\,pip_{k}(t^2)\,pip_{j}(t^2)\;\mathrm{d}t\right) \qquad\qquad (3)$$

```
> Rule[change,t^2=u,u](IO1b);
```

$$2\left(\int_{0}^{a} w(t)\,pip_{k}(t^2)\,pip_{j}(t^2)\;\mathrm{d}t\right) = 2\left(\int_{0}^{a^2} \frac{w(\sqrt{u})\,pip_{k}(u)\,pip_{j}(u)}{2\sqrt{u}}\;\mathrm{d}u\right) \qquad (4)$$

```
> Io2b:=2*Int(w(t)*t^2*pim[k](t^2)*pim[j](t^2),t=0..a);
```

$$Io2b := 2\left(\int_{0}^{a} w(t)\,t^2\,pim_{k}(t^2)\,pim_{j}(t^2)\;\mathrm{d}t\right) \qquad\qquad (5)$$

```
> Rule[change,t^2=u,u](Io2b);
```

$$2\left(\int_{0}^{a} w(t)\,t^2\,pim_{k}(t^2)\,pim_{j}(t^2)\;\mathrm{d}t\right) = 2\left(\int_{0}^{a^2} \frac{w(\sqrt{u})\,pim_{k}(u)\,pim_{j}(u)\,\sqrt{u}}{2}\;\mathrm{d}u\right) \qquad (6)$$

(b)

```
> restart;
> with(orthopoly);
```

$$[G, H, L, P, T, U] \qquad\qquad (7)$$

```
> p4:=P(4,t); p4/lcoeff(p4);
```

$$p4 := \frac{3}{8} + \frac{35}{8}\,t^4 - \frac{15}{4}\,t^2$$

$$\frac{3}{35} + t^4 - \frac{6}{7} t^2 \tag{8}$$

```
> p5:=P(5,t);p5/lcoeff(p5);
```

$$p5 := \frac{63}{8} t^5 - \frac{35}{4} t^3 + \frac{15}{8} t$$

$$t^5 - \frac{10}{9} t^3 + \frac{5}{21} t \tag{9}$$

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```
> pi01:=algsubs(t^2=u,p4): pi01:=sort(pi01/lcoeff(pi01));
```

$$\pi01 := u^2 - \frac{6}{7} u + \frac{3}{35} \tag{10}$$

```
> pi02:=algsubs(t^2=u,p5/t): pi02:=sort(pi02/lcoeff(pi02));
```

$$\pi02 := u^2 - \frac{10}{9} u + \frac{5}{21} \tag{11}$$

```
> prad:=proc(n,u)
  local p,q;
  description "orthogonal poly on [0,1] w.r.t w(t)=sqrt(t)";
  with(orthopoly);
  p:=P(2*n,t);
  q:=sort(algsubs(t^2=u,p));
  end proc;
```

$prad := \mathbf{proc}(n, u)$ (12)

    local $p, q;$

    description "orthogonal poly on [0,1] w.r.t w(t)=sqrt(t)";

    $with(orthopoly); \ p := P(2*n, t); \ q := sort(algsubs(t^\wedge 2 = u, p))$

end proc

```
> pirad:=proc(n,u)
  local p,q;
  description "orthogonal poly on [0,1] w.r.t w(t)=sqrt(t)";
  with(orthopoly);
  p:=simplify(P(2*n+1,t)/t);
  q:=sort(algsubs(t^2=u,p));
  end proc;
```

$pirad := \mathbf{proc}(n, u)$ (13)

    local $p, q;$

    description "orthogonal poly on [0,1] w.r.t w(t)=sqrt(t)";

    $with(orthopoly); \ p := simplify(P(2*n + 1, t)/t); \ q := sort(algsubs(t^\wedge 2 = u, p))$

end proc

```
> prr:=prad(2,u); prr:=prr/lcoeff(prr);
```

$$prr := \frac{35}{8} u^2 - \frac{15}{4} u + \frac{3}{8}$$

$$prr := u^2 - \frac{6}{7} u + \frac{3}{35} \tag{14}$$

```
> pir:=pirad(2,u); pir:=pir/lcoeff(pir);
```

$$pir := \frac{63}{8}\, u^2 - \frac{35}{4}\, u + \frac{15}{8}$$

$$pir := u^2 - \frac{10}{9}\, u + \frac{5}{21} \tag{15}$$

```
> prr:=prad(6,u): prr:=prr/lcoeff(prr);
```

$$prr := u^6 - \frac{66}{23}\, u^5 + \frac{495}{161}\, u^4 - \frac{660}{437}\, u^3 + \frac{2475}{7429}\, u^2 - \frac{198}{7429}\, u + \frac{33}{96577} \tag{16}$$

```
> pir:=pirad(6,u); pir:=pir/lcoeff(pir);
```

$$pir := \frac{1300075}{1024}\, u^6 - \frac{2028117}{512}\, u^5 + \frac{4849845}{1024}\, u^4 - \frac{692835}{256}\, u^3 + \frac{765765}{1024}\, u^2 - \frac{45045}{512}\, u$$
$$+ \frac{3003}{1024}$$

$$pir := u^6 - \frac{78}{25}\, u^5 + \frac{429}{115}\, u^4 - \frac{1716}{805}\, u^3 + \frac{1287}{2185}\, u^2 - \frac{2574}{37145}\, u + \frac{429}{185725} \tag{17}$$

```
> for k from 1 to 5 do
  int(sqrt(u)*pir*pirad(k,u),u=0..1);
  end do;
```

$$0$$
$$0$$
$$0$$
$$0$$
$$0 \tag{18}$$

c) formule de cuadratura cu doua noduri

```
> tp:=solve(pi01,u);
```

$$tp := \frac{3}{7} + \frac{2\sqrt{30}}{35}, \; \frac{3}{7} - \frac{2\sqrt{30}}{35} \tag{19}$$

```
> tm:=solve(pi02,u);
```

$$tm := \frac{5}{9} + \frac{2\sqrt{70}}{63}, \; \frac{5}{9} - \frac{2\sqrt{70}}{63} \tag{20}$$

```
> wp:=1/sqrt(u); wm:=sqrt(u);
```

$$wp := \frac{1}{\sqrt{u}}$$

$$wm := \sqrt{u} \tag{21}$$

```
> Qp:=f->int(wp*f(u),u=0..1)-A[1]*f(tp[1])-A[2]*f(tp[2]);
```

$$Qp := f \mapsto \int_0^1 wp\, f(u)\, du - A_1 f(tp_1) - A_2 f(tp_2) \tag{22}$$

```
> ec1:=Qp(t->1)=0;
```

$$ec1 := 2 - A_1 - A_2 = 0 \tag{23}$$

```
> ec2:=Qp(t->t)=0;
```

$$ec2 := \frac{2}{3} - A_1 \left(\frac{3}{7} + \frac{2\sqrt{30}}{35} \right) - A_2 \left(\frac{3}{7} - \frac{2\sqrt{30}}{35} \right) = 0 \tag{24}$$

```
> solve({ec1,ec2},{A[1],A[2]});
```

$$\left\{ A_1 = 1 - \frac{\sqrt{30}}{18}, A_2 = 1 + \frac{\sqrt{30}}{18} \right\} \tag{25}$$

```
> assign(%);
> Rp:=1/4!*(D@@4)(f)(xi)*int(wp*pi01^2,u=0..1);
```

$$Rp := \frac{16\,D^{(4)}(f)\,(\xi)}{33075} \tag{26}$$

```
> Int(wp*f(u),u=0..1)=A[1]*f(tp[1])+A[2]*f(tp[2])+Rp;
```

$$\int_0^1 \frac{f(u)}{\sqrt{u}}\,du = \left(1 - \frac{\sqrt{30}}{18} \right) f\left(\frac{3}{7} + \frac{2\sqrt{30}}{35} \right) + \left(1 + \frac{\sqrt{30}}{18} \right) f\left(\frac{3}{7} - \frac{2\sqrt{30}}{35} \right) \tag{27}$$

$$+ \frac{16\,D^{(4)}(f)\,(\xi)}{33075}$$

```
> Qm:=f->int(wm*f(u),u=0..1)-B[1]*f(tm[1])-B[2]*f(tm[2]);
```

$$Qm := f \mapsto \int_0^1 wm\,f(u)\,du - B_1 f\left(tm_1 \right) - B_2 f\left(tm_2 \right) \tag{28}$$

```
> ec1:=Qm(t->1)=0;
```

$$ec1 := \frac{2}{3} - B_1 - B_2 = 0 \tag{29}$$

```
> ec2:=Qm(t->t)=0;
```

$$ec2 := \frac{2}{5} - B_1 \left(\frac{5}{9} + \frac{2\sqrt{70}}{63} \right) - B_2 \left(\frac{5}{9} - \frac{2\sqrt{70}}{63} \right) = 0 \tag{30}$$

```
> solve({ec1,ec2},{B[1],B[2]});
```

$$\left\{ B_1 = \frac{1}{3} + \frac{\sqrt{70}}{150}, B_2 = \frac{1}{3} - \frac{\sqrt{70}}{150} \right\} \tag{31}$$

```
> assign(%);
> Qm(f);
```

$$\int_0^1 \sqrt{u}\,f(u)\,du - \left(\frac{1}{3} + \frac{\sqrt{70}}{150} \right) f\left(\frac{5}{9} + \frac{2\sqrt{70}}{63} \right) - \left(\frac{1}{3} - \frac{\sqrt{70}}{150} \right) f\left(\frac{5}{9} - \frac{2\sqrt{70}}{63} \right) \tag{32}$$

```
> Rm:=1/4!*(D@@4)(f)(xi)*int(wm*pi02^2,u=0..1);
```

$$Rm := \frac{16\,D^{(4)}(f)\,(\xi)}{130977} \tag{33}$$

```
> Int(wm*f(u),u=0..1)=B[1]*f(tm[1])+B[2]*f(tm[2])+Rm;
```

$$\int_0^1 \sqrt{u}\,f(u)\,du = \left(\frac{1}{3} + \frac{\sqrt{70}}{150} \right) f\left(\frac{5}{9} + \frac{2\sqrt{70}}{63} \right) + \left(\frac{1}{3} - \frac{\sqrt{70}}{150} \right) f\left(\frac{5}{9} - \frac{2\sqrt{70}}{63} \right) \tag{34}$$

$$+ \frac{16\,D^{(4)}(f)\,(\xi)}{130977}$$

```
> p6:=P(6,t);
```

$$p6 := -\frac{5}{16} + \frac{231}{16}\, t^6 - \frac{315}{16}\, t^4 + \frac{105}{16}\, t^2 \tag{35}$$

```
> p7:=P(7,t);
```

$$p7 := \frac{429}{16}\, t^7 - \frac{693}{16}\, t^5 + \frac{315}{16}\, t^3 - \frac{35}{16}\, t \tag{36}$$

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```
> unassign('A[1]','A[2]', 'B[1]','B[2]');
>
> pi01:=algsubs(t^2=u,p6): pi01:=sort(pi01/lcoeff(pi01));
```

$$\pi 01 := u^3 - \frac{15}{11}\, u^2 + \frac{5}{11}\, u - \frac{5}{231} \tag{37}$$

```
> pi02:=algsubs(t^2=u,p7/t): pi02:=sort(pi02/lcoeff(pi02));
```

$$\pi 02 := u^3 - \frac{21}{13}\, u^2 + \frac{105}{143}\, u - \frac{35}{429} \tag{38}$$

c) formule de cuadratura

```
> tp:=map(evalc,[solve(pi01,u)]);
```

$$tp := \left[\frac{4\sqrt{15}\,\cos\!\left(\dfrac{\arctan\!\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11},\; -\frac{2\sqrt{15}\,\cos\!\left(\dfrac{\arctan\!\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11} \right. \tag{39}$$

$$-\frac{2\sqrt{3}\,\sqrt{15}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33},\; -\frac{2\sqrt{15}\,\cos\!\left(\dfrac{\arctan\!\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11}$$

$$\left. +\frac{2\sqrt{3}\,\sqrt{15}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33} \right]$$

```
> tm:=map(evalc,[solve(pi02,u)]);;
```

$$tm := \left[\frac{4\sqrt{231}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143} + \frac{7}{13}, \right. \tag{40}$$

$$\left. -\frac{2\sqrt{231}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143} + \frac{7}{13} \right.$$

$$-\frac{2\sqrt{3}\sqrt{231}\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143},$$

$$-\frac{2\sqrt{231}\sin\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143}+\frac{7}{13}$$

$$+\frac{2\sqrt{3}\sqrt{231}\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143}\Bigg]$$

```
> wp:=1/sqrt(u); wm:=sqrt(u);
```

$$wp := \frac{1}{\sqrt{u}}$$

$$wm := \sqrt{u} \tag{41}$$

```
> Qp:=f->int(wp*f(u),u=0..1)-A[1]*f(tp[1])-A[2]*f(tp[2])-A[3]*f(tp
  [3]);
```

$$Qp := f \mapsto \int_0^1 wp\,f(u)\,\mathrm{d}u - A_1 f(tp_1) - A_2 f(tp_2) - A_3 f(tp_3) \tag{42}$$

```
> ec1:=Qp(t->1)=0;
```

$$ec1 := 2 - A_1 - A_2 - A_3 = 0 \tag{43}$$

```
> ec2:=Qp(t->t)=0;
```

$$ec2 := \frac{2}{3} - A_1\left(\frac{4\sqrt{15}\cos\left(\dfrac{\arctan\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33}+\frac{5}{11}\right) - A_2\Bigg(\tag{44}$$

$$-\frac{2\sqrt{15}\cos\left(\dfrac{\arctan\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33}+\frac{5}{11}-\frac{2\sqrt{3}\sqrt{15}\sin\left(\dfrac{\arctan\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33}\Bigg)$$

$$-A_3\Bigg(-\frac{2\sqrt{15}\cos\left(\dfrac{\arctan\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33}+\frac{5}{11}$$

$$+\frac{2\sqrt{3}\sqrt{15}\sin\left(\dfrac{\arctan\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)}{33}\Bigg) = 0$$

```
> ec3:=Qp(t->t^2)=0;
```

$$ec3 := \frac{2}{5} - A_1 \left(\frac{4\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11} \right)^2 - A_2 \Bigg($$

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$$\left(-\frac{2\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11} - \frac{2\sqrt{3}\sqrt{15}\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} \right)^2$$

$$-A_3 \left(-\frac{2\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11} \right.$$

$$\left. + \frac{2\sqrt{3}\sqrt{15}\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} \right)^2 \Bigg) = 0$$

```
> solve({ec1,ec2,ec3},{A[1],A[2],A[3]});
```

$$\left\{ A_1 = \left(2\left(-225\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)^2 + 75\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)^2 \right. \right. \right.$$

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$$\left. \left. - 20\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) + 141 \right) \right) \Bigg/ \left(75\left(\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\sqrt{3} \right. \right.$$

$$\left. \left. + 3\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \right) \right) \left(-\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\sqrt{3} \right.$$

$$+\ 3\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\Bigg)\Bigg)\Bigg),\ A_2 = -\Bigg(\Bigg($$

$$-\ 150\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\sqrt{3}$$

$$+\ 150\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)^2 - 10\sqrt{3}\sqrt{15}\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)$$

$$-\ 10\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) - 141\Bigg)\sqrt{3}\Bigg)\Bigg/$$

$$\Bigg(225\left(\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\sqrt{3}\right.$$

$$+\ 3\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\Bigg)\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\Bigg),\ A_3$$

$$= \Bigg(\Bigg(\Bigg(150 \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \Bigg) \sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \sqrt{3}$$

$$+ 150 \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg)^2 + 10\sqrt{3}\sqrt{15} \sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg)$$

$$- 10\sqrt{15} \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) - 141 \Bigg) \sqrt{3} \Bigg) \Bigg/ \Bigg(225 \Bigg($$

$$- \sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \sqrt{3} + 3 \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \Bigg)$$

$$\sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \Bigg) \Bigg)$$

```
> assign(%);
> Rp:=1/6!*(D@@6)(f)(xi)*int(wp*pi01^2,u=0..1);
```

$$Rp := \frac{32\, D^{(6)}(f)(\xi)}{31216185} \tag{47}$$

```
> Int(wp*f(u),u=0..1)=A[1]*f(tp[1])+A[2]*f(tp[2])+A[3]*f(tp[3])+Rp;
```

$$\int_0^1 \frac{f(u)}{\sqrt{u}}\, du = \Bigg(2 \Bigg(-225 \sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg)^2 + 75 \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg)^2$$

$$- 20\sqrt{15} \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) + 141 \Bigg) f\Bigg(\frac{4\sqrt{15} \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg)}{33}$$

$$+ \frac{5}{11} \Bigg) \Bigg) \Bigg/ \Bigg(75 \Bigg(\sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \sqrt{3} + 3 \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \Bigg) \Bigg($$

$$- \sin\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \sqrt{3} + 3 \cos\Bigg(\frac{\arctan\Big(\frac{11\sqrt{6}}{3} \Big)}{3} \Bigg) \Bigg) \Bigg) - \Bigg(\Bigg($$

$$-150 \cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \sqrt{3}$$

$$+ 150 \cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)^2 - 10\sqrt{3}\sqrt{15} \sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)$$

$$- 10\sqrt{15} \cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) - 141\right) \sqrt{3}\, f\left(-\frac{2\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} \right.$$

$$+ \frac{5}{11} - \frac{2\sqrt{3}\sqrt{15} \sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33}\right)\right) \Bigg/$$

$$\left(225\left(\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \sqrt{3}\right.\right.$$

$$\left.\left.+ 3\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\right) \sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\right)$$

$$+ \left(\left(\left(150\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \sqrt{3} + 150\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)^2 + 10 \right.\right.\right.$$

$$\left.- 141\right) \sqrt{3}\, f\left(-\frac{2\sqrt{15}\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33} + \frac{5}{11}\right.$$

$$\left.\left.\left.+ \frac{2\sqrt{3}\sqrt{15} \sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)}{33}\right)\right)\right) \Bigg/ \left(225\left(\right.\right.$$

$$\left.\left.-\sin\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right) \sqrt{3} + 3\cos\left(\frac{\arctan\left(\frac{11\sqrt{6}}{3}\right)}{3}\right)\right)\right)$$

$$\sin\!\left(\frac{\arctan\!\left(\dfrac{11\sqrt{6}}{3}\right)}{3}\right)\!\right)\!+\frac{32\,D^{(6)}(f)(\xi)}{31216185}$$

```
> Qm:=f->int(wm*f(u),u=0..1)-B[1]*f(tm[1])-B[2]*f(tm[2])-B[3]*f(tm
  [3]);
```

$$Qm := f \mapsto \int_0^1 wm\,f(u)\,du - B_1 f\big(tm_1\big) - B_2 f\big(tm_2\big) - B_3 f\big(tm_3\big) \tag{49}$$

```
> ec1:=Qm(t->1)=0;
```

$$ec1 := \frac{2}{3} - B_1 - B_2 - B_3 = 0 \tag{50}$$

```
> ec2:=Qm(t->t)=0;
```

$$
ec2 := \frac{2}{5} - B_1\left(\frac{4\sqrt{231}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143} + \frac{7}{13}\right) - B_2\Bigg(
$$

$$
-\frac{2\sqrt{231}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143} + \frac{7}{13}
$$

$$
-\frac{2\sqrt{3}\sqrt{231}\,\cos\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143}\Bigg) - B_3\Bigg(
$$

$$
-\frac{2\sqrt{231}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143} + \frac{7}{13}
$$

$$
+\frac{2\sqrt{3}\sqrt{231}\,\cos\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143}\Bigg) = 0 \tag{51}
$$

```
> ec2:=Qm(t->t^2)=0;
```

$$
ec2 := \frac{2}{7} - B_1\left(\frac{4\sqrt{231}\,\sin\!\left(\dfrac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3} + \dfrac{\pi}{6}\right)}{143} + \frac{7}{13}\right)^{\!2} - B_2\Bigg(\tag{52}
$$

$$-\frac{2\sqrt{231}\,\sin\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143}+\frac{7}{13}$$

$$-\frac{2\sqrt{3}\,\sqrt{231}\,\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143}\Bigg)^{2}-B_3\Bigg($$

$$-\frac{2\sqrt{231}\,\sin\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143}+\frac{7}{13}$$

$$+\frac{2\sqrt{3}\,\sqrt{231}\,\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)}{143}\Bigg)=0$$

```
> solve({ec1,ec2,ec3},{B[1],B[2],B[3]});
```

$$B_1 = \Bigg(2\Bigg(4851\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)^{2}+3234\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.+\dfrac{\pi}{6}\right)\sin\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)\sqrt{3}+1617\sin\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)^{2}$$

$$-539\sqrt{3}\,\sqrt{231}\,\cos\left(\dfrac{\arctan\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\dfrac{\pi}{6}\right)$$

$$-539\sqrt{231}\,\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)-4961\Bigg)\sqrt{231}\Bigg)\Bigg/$$

$$\Bigg(4851\Bigg(3\sqrt{231}\,\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^{2}$$

$$+2\sqrt{231}\,\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}$$

$$-3\sqrt{231}\,\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^{2}-77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.+\frac{\pi}{6}\right)\sqrt{3}-231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\Bigg)\Bigg)$$

$$-\Bigg(2\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}\Bigg(2\sqrt{231}\,\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)-77\Bigg)B_{3}\Bigg)\Bigg/$$

$$+ \frac{\pi}{6} \Bigg) \sqrt{3} - 3\sqrt{231}\, \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{2}$$

$$- 77 \cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sqrt{3} - 231 \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \Bigg),$$

$$B_2 = - \Bigg(\Bigg(3\sqrt{231}\, \cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{2}$$

$$- 2\sqrt{231}\, \cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sqrt{3}$$

$$- 3\sqrt{231}\, \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{2} + 77 \cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.$$

$$\left. + \frac{\pi}{6} \right) \sqrt{3} - 231 \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \Bigg) B_3 \Bigg) \Bigg/$$

$$
\Bigg(3\sqrt{231}\,\cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{\!2} + 2\sqrt{231}\,\cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.
$$

$$
\left. + \frac{\pi}{6} \right) \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)\sqrt{3} - 3\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.
$$

$$
\left. + \frac{\pi}{6} \right)^{\!2} - 77\cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)\sqrt{3} - 231\sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.
$$

$$
\left. + \frac{\pi}{6} \right) \Bigg) - \Bigg(2\Bigg(6468\sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{\!2}
$$

$$
+ 1078\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) - 4961 \Bigg)\sqrt{231} \Bigg) \Bigg/
$$

$$
\Bigg(4851\Bigg(3\sqrt{231}\,\cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{\!2}
$$

$$
+ 2\sqrt{231}\,\cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)\sqrt{3}
$$

$$
- 3\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^{\!2} - 77\cos\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.
$$

$$
\left. + \frac{\pi}{6} \right)\sqrt{3} - 231\sin\!\left(\frac{\arctan\!\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \Bigg) \Bigg), \; B_3 = B_3 \Bigg\}
$$

```
> assign(%);
> Qm(f);
```

$$\int_0^1 \sqrt{u}\, f(u)\, du - \left(\left(\left(2\left(4851\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\right)^2\right.\right.\right.$$

$$+ 3234\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3}$$

$$+ 1617\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2 - 539\sqrt{3}\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.\left.\left.+ \frac{\pi}{6}\right) - 539\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right) - 4961\right)\sqrt{231}\right) \Bigg/$$

$$\left(4851\left(3\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\right)^2\right.$$

$$+ 2\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3}$$

$$-3\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^{2}-77\cos\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.+\frac{\pi}{6}\right)\sqrt{3}-231\sin\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\right)\right)$$

$$-\left(2\cos\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}\left(2\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)-77\right)B_{3}\right)\Bigg/$$

$$+\frac{\pi}{6}\right)\sqrt{3}-3\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^{2}$$

$$-77\cos\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}-231\sin\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\right)\right)$$

$$f\!\left(\frac{4\sqrt{231}\,\sin\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)}{143}+\frac{7}{13}\right)-\left(\rule{0pt}{3em}\right.$$

$$-\left(\left(3\sqrt{231}\,\cos\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^{2}-2\sqrt{231}\,\cos\!\left(\frac{\arctan\!\left(\dfrac{13\sqrt{110}}{11}\right)}{3}\right.\right.\right.$$

$$+\left.\frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}-3\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right)$$

$$\left.+\frac{\pi}{6}\right)^2+77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}-231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right)$$

$$\left.\left.\left.+\frac{\pi}{6}\right)\right)B_3\right)\Big/\left(3\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^2\right.$$

$$+2\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}$$

$$-3\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)^2-77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right)$$

$$\left.\left.+\frac{\pi}{6}\right)\sqrt{3}-231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\right)$$

$$-\left(2\left(6468\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)+1078\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)-4961\right.\right.$$

$$\left.+\frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}-3\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.\left.+\frac{\pi}{6}\right)^2-77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\sqrt{3}-231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.\right.$$

$$\left.\left.\left.+\frac{\pi}{6}\right)\right)\right)f\left(-\frac{2\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)}{143}+\frac{7}{13}\right.$$

$$\left.-\frac{2\sqrt{3}\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)}{143}\right)-B_3 f\left(\right.$$

$$-\frac{2\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)}{143}+\frac{7}{13}$$

$$\left.+\frac{2\sqrt{3}\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)}{143}\right)$$

```
> Rm:=1/6!*(D@@6)(f)(xi)*int(wm*pi02^2,u=0..1);
```

$$Rm := \frac{32\,\mathrm{D}^{(6)}(f)(\xi)}{124227675} \tag{55}$$

```
> Int(wm*f(u),u=0..1)=B[1]*f(tm[1])+B[2]*f(tm[2])+B[3]*f(tm[3])+Rm;
```

$$\int_0^1 \sqrt{u}\, f(u)\, \mathrm{d}u = \left(\left(2\left(4851\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}+\frac{\pi}{6}\right)\right)^2\right.\right.$$

$$+ 3234 \cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right) \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3}$$

$$+ 1617 \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2 - 539\sqrt{3}\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left. + \frac{\pi}{6}\right) - 539\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right) - 4961\right)\sqrt{231}\Bigg/$$

$$\left(4851\left(3\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2\right.\right.$$

$$+ 2\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3}$$

$$- 3\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2 - 77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$+ \frac{\pi}{6} \Bigg) \sqrt{3} - 231 \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \Bigg) \Bigg)$$

$$- \Bigg(2\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sqrt{3} \left(2\sqrt{231} \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) - 77 \right) B_3 \Bigg) \Bigg/$$

$$+ \frac{\pi}{6} \Bigg) \sqrt{3} - 3\sqrt{231} \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^2$$

$$- 77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sqrt{3} - 231 \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \Bigg) \Bigg)$$

$$f\Bigg(\frac{4\sqrt{231} \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)}{143} + \frac{7}{13} \Bigg) +$$

$$- \Bigg(\Bigg(3\sqrt{231} \cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right)^2 - 2\sqrt{231} \cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.$$

$$+ \frac{\pi}{6} \Bigg) \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} + \frac{\pi}{6} \right) \sqrt{3} - 3\sqrt{231} \sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11} \right)}{3} \right.$$

$$+\left.\frac{\pi}{6}\right)^2 + 77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3} - 231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.\left.+\frac{\pi}{6}\right)\right)B_3\right) \bigg/ \left(3\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2\right.$$

$$+ 2\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3}$$

$$- 3\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2 - 77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.+\frac{\pi}{6}\right)\sqrt{3} - 231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\bigg)$$

$$-\left(\left(2\left(6468\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)^2 + 1078\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right) - 4961\right.\right.$$

$$\left.+\frac{\pi}{6}\right)\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3} - 3\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left. + \frac{\pi}{6}\right)^2 - 77\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)\sqrt{3} - 231\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3}\right.$$

$$\left.\left.\left.\left.\left. + \frac{\pi}{6}\right)\right)\right)\right)\right) f\left(-\frac{2\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)}{143} + \frac{7}{13}\right.$$

$$\left.\left. - \frac{2\sqrt{3}\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)}{143}\right)\right) + B_3 f\left(\vphantom{\frac{2}{1}}\right.$$

$$-\frac{2\sqrt{231}\sin\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)}{143} + \frac{7}{13}$$

$$\left.\left. + \frac{2\sqrt{3}\sqrt{231}\cos\left(\frac{\arctan\left(\frac{13\sqrt{110}}{11}\right)}{3} + \frac{\pi}{6}\right)}{143}\right)\right) + \frac{32\,\mathrm{D}^{(6)}(f)(\xi)}{124227675}$$

>

>