Rubi 4.16.1.4 Integration Test Results

on the problems in the test-suite directory "1 Algebraic functions"

Test results for the 1917 problems in "1.1.1.2 (a+b x)^m (c+d x)^n.m"

Problem 369: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \left(-\frac{b\, x^m}{2\, (a+b\, x)^{3/2}}+\frac{m\, x^{-1+m}}{\sqrt{a+b\, x}}\right) dx$$

Optimal (type 3, 13 leaves, ? steps):

$$\frac{x^m}{\sqrt{a+b\, x}}$$

Result (type 5, 92 leaves, 5 steps):

$$\frac{x^m \left(-\frac{b\, x}{a}\right)^{-m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\, -m,\, \frac{1}{2},\, 1+\frac{b\, x}{a}\right]}{\sqrt{a+b\, x}}-\frac{2\, m\, x^m \left(-\frac{b\, x}{a}\right)^{-m} \sqrt{a+b\, x}\; \text{Hypergeometric2F1}\left[\frac{1}{2},\, 1-m,\, \frac{3}{2},\, 1+\frac{b\, x}{a}\right]}{a}$$

Test results for the 3201 problems in "1.1.1.3 (a+b x)^m (c+d x)^n (e+f x)^p.m"

Problem 957: Result valid but suboptimal antiderivative.

$$\int (e\, x)^m\, (a-b\, x)^{2+n}\, (a+b\, x)^n\, dx$$

Optimal (type 5, 211 leaves, ? steps):

$$-\frac{(e x)^{1+m} (a-b x)^{1+n} (a+b x)^{1+n}}{e (3+m+2 n)}+\frac{2 a^2 (2+m+n) (e x)^{1+m} (a-b x)^n (a+b x)^n \left(1-\frac{b^2 x^2}{a^2}\right)^{-n} \text{Hypergeometric2F1}\left[\frac{1+m}{2},-n,\frac{3+m}{2},\frac{b^2 x^2}{a^2}\right]}{e (1+m) (3+m+2 n)}-$$
$$\frac{2 a b (e x)^{2+m} (a-b x)^n (a+b x)^n \left(1-\frac{b^2 x^2}{a^2}\right)^{-n} \text{Hypergeometric2F1}\left[\frac{2+m}{2},-n,\frac{4+m}{2},\frac{b^2 x^2}{a^2}\right]}{e^2 (2+m)}$$

Result (type 5, 238 leaves, 11 steps):

$$\frac{a^2 (e x)^{1+m} (a-b x)^n (a+b x)^n \left(1-\frac{b^2 x^2}{a^2}\right)^{-n} \text{Hypergeometric2F1}\left[\frac{1+m}{2},-n,\frac{3+m}{2},\frac{b^2 x^2}{a^2}\right]}{e (1+m)}-$$
$$\frac{2 a b (e x)^{2+m} (a-b x)^n (a+b x)^n \left(1-\frac{b^2 x^2}{a^2}\right)^{-n} \text{Hypergeometric2F1}\left[\frac{2+m}{2},-n,\frac{4+m}{2},\frac{b^2 x^2}{a^2}\right]}{e^2 (2+m)}+$$
$$\frac{b^2 (e x)^{3+m} (a-b x)^n (a+b x)^n \left(1-\frac{b^2 x^2}{a^2}\right)^{-n} \text{Hypergeometric2F1}\left[\frac{3+m}{2},-n,\frac{5+m}{2},\frac{b^2 x^2}{a^2}\right]}{e^3 (3+m)}$$

Test results for the 159 problems in "1.1.1.4 (a+b x)^m (c+d x)^n (e+f x)^p (g+h x)^q.m"

Problem 111: Unable to integrate problem.

$$\int \frac{1}{(a+b x)^{3/2} (c+d x)^{3/2} \sqrt{e+f x} \sqrt{g+h x}} \, dx$$

Optimal (type 4, 786 leaves, ? steps):

$$-\frac{2\,d^3\,\sqrt{a+b\,x}\,\sqrt{e+f\,x}\,\sqrt{g+h\,x}}{(b\,c-a\,d)^2\,(d\,e-c\,f)\,(d\,g-c\,h)\,\sqrt{c+d\,x}}-\frac{2\,b^3\,\sqrt{c+d\,x}\,\sqrt{e+f\,x}\,\sqrt{g+h\,x}}{(b\,c-a\,d)^2\,(b\,e-a\,f)\,(b\,g-a\,h)\,\sqrt{a+b\,x}}+$$

$$\frac{2\,b\,\left(a^2\,d^2\,f\,h-a\,b\,d^2\,(f\,g+e\,h)+b^2\,\left(2\,d^2\,e\,g+c^2\,f\,h-c\,d\,(f\,g+e\,h)\right)\right)\,\sqrt{c+d\,x}\,\sqrt{e+f\,x}\,\sqrt{g+h\,x}}{(b\,c-a\,d)^2\,(b\,e-a\,f)\,(d\,e-c\,f)\,(b\,g-a\,h)\,(d\,g-c\,h)\,\sqrt{a+b\,x}}-$$

$$\left(2\,\sqrt{f\,g-e\,h}\,\left(a^2\,d^2\,f\,h-a\,b\,d^2\,(f\,g+e\,h)+b^2\,\left(2\,d^2\,e\,g+c^2\,f\,h-c\,d\,(f\,g+e\,h)\right)\right)\right.$$

$$\left.\sqrt{c+d\,x}\,\sqrt{-\frac{(b\,e-a\,f)\,(g+h\,x)}{(f\,g-e\,h)\,(a+b\,x)}}\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{b\,g-a\,h}\,\sqrt{e+f\,x}}{\sqrt{f\,g-e\,h}\,\sqrt{a+b\,x}}\right],\,-\frac{(b\,c-a\,d)\,(f\,g-e\,h)}{(d\,e-c\,f)\,(b\,g-a\,h)}\right]\right)\Big/$$

$$\left((b\,c-a\,d)^2\,(b\,e-a\,f)\,(d\,e-c\,f)\,\sqrt{b\,g-a\,h}\,(d\,g-c\,h)\,\sqrt{\frac{(b\,e-a\,f)\,(c+d\,x)}{(d\,e-c\,f)\,(a+b\,x)}}\,\sqrt{g+h\,x}\right)-$$

$$\frac{4\,b\,d\,\sqrt{\frac{(b\,e-a\,f)\,(c+d\,x)}{(d\,e-c\,f)\,(a+b\,x)}}\,\sqrt{g+h\,x}\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{b\,g-a\,h}\,\sqrt{e+f\,x}}{\sqrt{f\,g-e\,h}\,\sqrt{a+b\,x}}\right],\,-\frac{(b\,c-a\,d)\,(f\,g-e\,h)}{(d\,e-c\,f)\,(b\,g-a\,h)}\right]}{(b\,c-a\,d)^2\,\sqrt{b\,g-a\,h}\,\sqrt{f\,g-e\,h}\,\sqrt{c+d\,x}\,\sqrt{-\frac{(b\,e-a\,f)\,(g+h\,x)}{(f\,g-e\,h)\,(a+b\,x)}}}$$

Result (type 8, 39 leaves, 0 steps):

$$\text{CannotIntegrate}\left[\frac{1}{(a+b\,x)^{3/2}\,(c+d\,x)^{3/2}\,\sqrt{e+f\,x}\,\sqrt{g+h\,x}},\,x\right]$$

Test results for the 34 problems in "1.1.1.5 P(x) (a+b x)^m (c+d x)^n.m"

Test results for the 78 problems in "1.1.1.6 P(x) (a+b x)^m (c+d x)^n (e+f x)^p.m"

Test results for the 35 problems in "1.1.1.7 P(x) (a+b x)^m (c+d x)^n (e+f x)^p (g+h x)^q.m"

Test results for the 1071 problems in "1.1.2.2 (c x)^m (a+b x^2)^p.m"

Problem 662: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(\frac{a\,(2+m)\,x^{1+m}}{\sqrt{a+b\,x^2}}+\frac{b\,(3+m)\,x^{3+m}}{\sqrt{a+b\,x^2}}\right)dx$$

Optimal (type 3, 17 leaves, ? steps):

$$x^{2+m}\sqrt{a+b\,x^2}$$

Result (type 5, 127 leaves, 5 steps):

$$\frac{a\,x^{2+m}\sqrt{1+\frac{b\,x^2}{a}}\ \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},-\frac{b\,x^2}{a}\right]}{\sqrt{a+b\,x^2}}+\frac{b\,(3+m)\,x^{4+m}\sqrt{1+\frac{b\,x^2}{a}}\ \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{4+m}{2},\frac{6+m}{2},-\frac{b\,x^2}{a}\right]}{(4+m)\sqrt{a+b\,x^2}}$$

Problem 664: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(-\frac{b\,x^{1+m}}{\left(a+b\,x^2\right)^{3/2}}+\frac{m\,x^{-1+m}}{\sqrt{a+b\,x^2}}\right)dx$$

Optimal (type 3, 15 leaves, ? steps):

$$\frac{x^m}{\sqrt{a+b\,x^2}}$$

Result (type 5, 123 leaves, 5 steps):

$$\frac{x^m\sqrt{1+\frac{b\,x^2}{a}}\ \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{m}{2},\frac{2+m}{2},-\frac{b\,x^2}{a}\right]}{\sqrt{a+b\,x^2}}-\frac{b\,x^{2+m}\sqrt{1+\frac{b\,x^2}{a}}\ \text{Hypergeometric2F1}\left[\frac{3}{2},\frac{2+m}{2},\frac{4+m}{2},-\frac{b\,x^2}{a}\right]}{a\,(2+m)\sqrt{a+b\,x^2}}$$

Test results for the 349 problems in "1.1.2.3 (a+b x^2)^p (c+d x^2)^q.m"

Problem 301: Result unnecessarily involves higher level functions.

$$\int\frac{\left(1-2\,x^2\right)^m}{\sqrt{1-x^2}}\,dx$$

Optimal (type 5, 62 leaves, ? steps):

$$-\frac{2^{-2-m}\sqrt{x^2}\left(2-4x^2\right)^{1+m}\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\left(1-2x^2\right)^2\right]}{(1+m)\,x}$$

Result (type 6, 23 leaves, 1 step):

$$x\,\text{AppellF1}\left[\frac{1}{2},-m,\frac{1}{2},\frac{3}{2},2x^2,x^2\right]$$

Test results for the 1156 problems in "1.1.2.4 (e x)^m (a+b x^2)^p (c+d x^2)^q.m"

Test results for the 115 problems in "1.1.2.5 (a+b x^2)^p (c+d x^2)^q (e+f x^2)^r.m"

Test results for the 51 problems in "1.1.2.6 (g x)^m (a+b x^2)^p (c+d x^2)^q (e+f x^2)^r.m"

Test results for the 174 problems in "1.1.2.8 P(x) (c x)^m (a+b x^2)^p.m"

Test results for the 3078 problems in "1.1.3.2 (c x)^m (a+b x^n)^p.m"

Problem 2686: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(-\frac{b\,n\,x^{-1+m+n}}{2\left(a+b\,x^n\right)^{3/2}}+\frac{m\,x^{-1+m}}{\sqrt{a+b\,x^n}}\right)dx$$

Optimal (type 3, 15 leaves, ? steps):

$$\frac{x^m}{\sqrt{a+b\,x^n}}$$

Result (type 5, 126 leaves, 5 steps):

$$\frac{x^m\sqrt{1+\frac{b\,x^n}{a}}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{m}{n},\frac{m+n}{n},-\frac{b\,x^n}{a}\right]}{\sqrt{a+b\,x^n}}-\frac{b\,n\,x^{m+n}\sqrt{1+\frac{b\,x^n}{a}}\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{m+n}{n},2+\frac{m}{n},-\frac{b\,x^n}{a}\right]}{2\,a\,(m+n)\sqrt{a+b\,x^n}}$$

Problem 2697: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(\frac{6\,a\,x^2}{b\,(4+m)\,\sqrt{a+b\,x^{-2+m}}}+\frac{x^m}{\sqrt{a+b\,x^{-2+m}}}\right)dx$$

Optimal (type 3, 26 leaves, ? steps):

$$\frac{2\,x^3\,\sqrt{a+b\,x^{-2+m}}}{b\,(4+m)}$$

Result (type 5, 160 leaves, 5 steps):

$$\frac{2\,a\,x^3\,\sqrt{1+\frac{b\,x^{-2+m}}{a}}\,\text{Hypergeometric2F1}\left[\frac{1}{2},-\frac{3}{2-m},-\frac{1+m}{2-m},-\frac{b\,x^{-2+m}}{a}\right]}{b\,(4+m)\,\sqrt{a+b\,x^{-2+m}}}+\frac{x^{1+m}\,\sqrt{1+\frac{b\,x^{-2+m}}{a}}\,\text{Hypergeometric2F1}\left[\frac{1}{2},-\frac{1+m}{2-m},\frac{1-2\,m}{2-m},-\frac{b\,x^{-2+m}}{a}\right]}{(1+m)\,\sqrt{a+b\,x^{-2+m}}}$$

Problem 2699: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(-\frac{b\,n\,x^{-1+m+n}}{2\,\left(a+b\,x^n\right)^{3/2}}+\frac{m\,x^{-1+m}}{\sqrt{a+b\,x^n}}\right)dx$$

Optimal (type 3, 15 leaves, ? steps):

$$\frac{x^m}{\sqrt{a+b\,x^n}}$$

Result (type 5, 126 leaves, 5 steps):

$$\frac{x^m\,\sqrt{1+\frac{b\,x^n}{a}}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{m}{n},\frac{m+n}{n},-\frac{b\,x^n}{a}\right]}{\sqrt{a+b\,x^n}}-\frac{b\,n\,x^{m+n}\,\sqrt{1+\frac{b\,x^n}{a}}\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{m+n}{n},2+\frac{m}{n},-\frac{b\,x^n}{a}\right]}{2\,a\,(m+n)\,\sqrt{a+b\,x^n}}$$

Test results for the 385 problems in "1.1.3.3 (a+b x^n)^p (c+d x^n)^q.m"

Test results for the 1081 problems in "1.1.3.4 (e x)^m (a+b x^n)^p (c+d x^n)^q.m"

Problem 455: Result unnecessarily involves higher level functions.

$$\int\frac{x^6}{\left(8\,c-d\,x^3\right)^2\,\left(c+d\,x^3\right)^{3/2}}\,dx$$

Optimal (type 4, 256 leaves, ? steps):

$$\frac{2 x \left(4 c+d x^3\right)}{81 c d^2 \left(8 c-d x^3\right) \sqrt{c+d x^3}}-\frac{2 \sqrt{2+\sqrt{3}} \left(c^{1/3}+d^{1/3} x\right) \sqrt{\frac{c^{2/3}-c^{1/3} d^{1/3} x+d^{2/3} x^2}{\left(\left(1+\sqrt{3}\right) c^{1/3}+d^{1/3} x\right)^2}} \text{EllipticF}\left[\text{ArcSin}\left[\frac{\left(1-\sqrt{3}\right) c^{1/3}+d^{1/3} x}{\left(1+\sqrt{3}\right) c^{1/3}+d^{1/3} x}\right],-7-4 \sqrt{3}\right]}{81\times 3^{1/4} c d^{7/3} \sqrt{\frac{c^{1/3} \left(c^{1/3}+d^{1/3} x\right)}{\left(\left(1+\sqrt{3}\right) c^{1/3}+d^{1/3} x\right)^2}} \sqrt{c+d x^3}}$$

Result (type 6, 66 leaves, 2 steps):

$$\frac{x^7 \sqrt{1+\frac{d x^3}{c}} \text{AppellF1}\left[\frac{7}{3},2,\frac{3}{2},\frac{10}{3},\frac{d x^3}{8 c},-\frac{d x^3}{c}\right]}{448 c^3 \sqrt{c+d x^3}}$$

Test results for the 46 problems in "1.1.3.6 (g x)^m (a+b x^n)^p (c+d x^n)^q (e+f x^n)^r.m"

Test results for the 594 problems in "1.1.3.8 P(x) (c x)^m (a+b x^n)^p.m"

Test results for the 454 problems in "1.1.4.2 (c x)^m (a x^j+b x^n)^p.m"

Test results for the 298 problems in "1.1.4.3 (e x)^m (a x^j+b x^k)^p (c+d x^n)^q.m"

Test results for the 143 problems in "1.2.1.1 (a+b x+c x^2)^p.m"

Test results for the 2590 problems in "1.2.1.2 (d+e x)^m (a+b x+c x^2)^p.m"

Test results for the 2646 problems in "1.2.1.3 (d+e x)^m (f+g x) (a+b x+c x^2)^p.m"

Test results for the 958 problems in "1.2.1.4 (d+e x)^m (f+g x)^n (a+b x+c x^2)^p.m"

Problem 833: Result valid but suboptimal antiderivative.

$$\int \frac{\sqrt{-1+x} \sqrt{1+x}}{1+x-x^2} \, dx$$

Optimal (type 3, 91 leaves, ? steps):

$$-\text{ArcCosh}[x]+\sqrt{\frac{2}{5}\left(-1+\sqrt{5}\right)}\ \text{ArcTan}\left[\frac{\sqrt{1+x}}{\sqrt{-2+\sqrt{5}}\ \sqrt{-1+x}}\right]+\sqrt{\frac{2}{5}\left(1+\sqrt{5}\right)}\ \text{ArcTanh}\left[\frac{\sqrt{1+x}}{\sqrt{2+\sqrt{5}}\ \sqrt{-1+x}}\right]$$

Result (type 3, 191 leaves, 9 steps):

$$\frac{\sqrt{\frac{1}{10}\left(-1+\sqrt{5}\right)}\ \sqrt{-1+x}\ \sqrt{1+x}\ \text{ArcTan}\left[\frac{2-\left(1-\sqrt{5}\right)x}{\sqrt{2\left(-1+\sqrt{5}\right)}\ \sqrt{-1+x^2}}\right]}{\sqrt{-1+x^2}}-$$

$$\frac{\sqrt{-1+x}\ \sqrt{1+x}\ \text{ArcTanh}\left[\frac{x}{\sqrt{-1+x^2}}\right]}{\sqrt{-1+x^2}}-\frac{\sqrt{\frac{1}{10}\left(1+\sqrt{5}\right)}\ \sqrt{-1+x}\ \sqrt{1+x}\ \text{ArcTanh}\left[\frac{2-\left(1+\sqrt{5}\right)x}{\sqrt{2\left(1+\sqrt{5}\right)}\ \sqrt{-1+x^2}}\right]}{\sqrt{-1+x^2}}$$

Test results for the 123 problems in "1.2.1.5 (a+b x+c x^2)^p (d+e x+f x^2)^q.m"

Test results for the 143 problems in "1.2.1.6 (g+h x)^m (a+b x+c x^2)^p (d+e x+f x^2)^q.m"

Test results for the 400 problems in "1.2.1.9 P(x) (d+e x)^m (a+b x+c x^2)^p.m"

Test results for the 1126 problems in "1.2.2.2 (d x)^m (a+b x^2+c x^4)^p.m"

Test results for the 413 problems in "1.2.2.3 (d+e x^2)^m (a+b x^2+c x^4)^p.m"

Problem 174: Unable to integrate problem.

$$\int \frac{\sqrt{a+b\,x^2}}{\sqrt{1-x^4}}\,dx$$

Optimal (type 4, 112 leaves, ? steps):

$$\frac{a\sqrt{1-x^2}\,\sqrt{\frac{a\,(1+x^2)}{a+b\,x^2}}\;\text{EllipticPi}\left[\frac{b}{a+b},\,\text{ArcSin}\left[\frac{\sqrt{a+b}\;x}{\sqrt{a+b\,x^2}}\right],\,-\frac{a-b}{a+b}\right]}{\sqrt{a+b}\;\sqrt{1+x^2}\;\sqrt{\frac{a\,(1-x^2)}{a+b\,x^2}}}$$

Result (type 8, 25 leaves, 0 steps):

$$\text{Unintegrable}\left[\frac{\sqrt{a+b\,x^2}}{\sqrt{1-x^4}},\,x\right]$$

Test results for the 413 problems in "1.2.2.4 (f x)^m (d+e x^2)^q (a+b x^2+c x^4)^p.m"

Problem 374: Result valid but suboptimal antiderivative.

$$\int \frac{\left(d+e\,x^2\right)^{3/2}}{x^2\,\left(a+b\,x^2+c\,x^4\right)}\,dx$$

Optimal (type 3, 260 leaves, ? steps):

$$-\frac{d\sqrt{d+e\,x^2}}{a\,x}-\frac{\left(2\,c\,d-\left(b-\sqrt{b^2-4\,a\,c}\right)e\right)^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{2\,c\,d-\left(b-\sqrt{b^2-4\,a\,c}\right)e}\;x}{\sqrt{b-\sqrt{b^2-4\,a\,c}}\;\sqrt{d+e\,x^2}}\right]}{\sqrt{b^2-4\,a\,c}\,\left(b-\sqrt{b^2-4\,a\,c}\right)^{3/2}}+\frac{\left(2\,c\,d-\left(b+\sqrt{b^2-4\,a\,c}\right)e\right)^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{2\,c\,d-\left(b+\sqrt{b^2-4\,a\,c}\right)e}\;x}{\sqrt{b+\sqrt{b^2-4\,a\,c}}\;\sqrt{d+e\,x^2}}\right]}{\sqrt{b^2-4\,a\,c}\,\left(b+\sqrt{b^2-4\,a\,c}\right)^{3/2}}$$

Result (type 3, 432 leaves, 16 steps):

$$-\frac{d\sqrt{d+e x^2}}{a x}-\frac{\sqrt{2 c d-\left(b-\sqrt{b^2-4 a c}\right) e}\left(d+\frac{b d-2 a e}{\sqrt{b^2-4 a c}}\right) \text{ArcTan}\left[\frac{\sqrt{2 c d-\left(b-\sqrt{b^2-4 a c}\right) e}\ x}{\sqrt{b-\sqrt{b^2-4 a c}}\ \sqrt{d+e x^2}}\right]}{2 a \sqrt{b-\sqrt{b^2-4 a c}}}-$$

$$\frac{\sqrt{2 c d-\left(b+\sqrt{b^2-4 a c}\right) e}\left(d-\frac{b d-2 a e}{\sqrt{b^2-4 a c}}\right) \text{ArcTan}\left[\frac{\sqrt{2 c d-\left(b+\sqrt{b^2-4 a c}\right) e}\ x}{\sqrt{b+\sqrt{b^2-4 a c}}\ \sqrt{d+e x^2}}\right]}{2 a \sqrt{b+\sqrt{b^2-4 a c}}}+\frac{d\sqrt{e}\ \text{ArcTanh}\left[\frac{\sqrt{e}\ x}{\sqrt{d+e x^2}}\right]}{a}-$$

$$\frac{\sqrt{e}\left(d-\frac{b d-2 a e}{\sqrt{b^2-4 a c}}\right) \text{ArcTanh}\left[\frac{\sqrt{e}\ x}{\sqrt{d+e x^2}}\right]}{2 a}-\frac{\sqrt{e}\left(d+\frac{b d-2 a e}{\sqrt{b^2-4 a c}}\right) \text{ArcTanh}\left[\frac{\sqrt{e}\ x}{\sqrt{d+e x^2}}\right]}{2 a}$$

Test results for the 111 problems in "1.2.2.5 P(x) (a+b x^2+c x^4)^p.m"

Test results for the 145 problems in "1.2.2.6 P(x) (d x)^m (a+b x^2+c x^4)^p.m"

Test results for the 42 problems in "1.2.2.7 P(x) (d+e x^2)^q (a+b x^2+c x^4)^p.m"

Test results for the 4 problems in "1.2.2.8 P(x) (d+e x)^q (a+b x^2+c x^4)^p.m"

Test results for the 664 problems in "1.2.3.2 (d x)^m (a+b x^n+c x^(2 n))^p.m"

Problem 24: Result valid but suboptimal antiderivative.

$$\int x^8 \left(a^2+2 a b x^3+b^2 x^6\right)^{3/2} dx$$

Optimal (type 2, 119 leaves, ? steps):

$$\frac{a^2 \left(a+b x^3\right)^3 \sqrt{a^2+2 a b x^3+b^2 x^6}}{12 b^3}-\frac{2 a \left(a+b x^3\right)^4 \sqrt{a^2+2 a b x^3+b^2 x^6}}{15 b^3}+\frac{\left(a+b x^3\right)^5 \sqrt{a^2+2 a b x^3+b^2 x^6}}{18 b^3}$$

Result (type 2, 167 leaves, 4 steps):

$$\frac{a^3 x^9 \sqrt{a^2+2 a b x^3+b^2 x^6}}{9 \left(a+b x^3\right)}+\frac{a^2 b x^{12} \sqrt{a^2+2 a b x^3+b^2 x^6}}{4 \left(a+b x^3\right)}+\frac{a b^2 x^{15} \sqrt{a^2+2 a b x^3+b^2 x^6}}{5 \left(a+b x^3\right)}+\frac{b^3 x^{18} \sqrt{a^2+2 a b x^3+b^2 x^6}}{18 \left(a+b x^3\right)}$$

Problem 478: Result unnecessarily involves higher level functions.

$$\int\left(\frac{\left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p}{x^2}-\frac{2 b^3 (1-2 p) (1-p) p \left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p}{3 a^3 x}\right) dx$$

Optimal (type 3, 146 leaves, ? steps):

$$-\frac{\left(a+b x^{1/3}\right) \left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p}{a x}+\frac{b (1-p) \left(a+b x^{1/3}\right) \left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p}{a^2 x^{2/3}}-\frac{b^2 (1-2 p) (1-p) \left(a+b x^{1/3}\right) \left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p}{a^3 x^{1/3}}$$

Result (type 5, 162 leaves, 7 steps):

$$\frac{1}{a^3 (1+2 p)} 2 b^3 (1-2 p) (1-p) p \left(1+\frac{b x^{1/3}}{a}\right) \left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p \text{Hypergeometric2F1}\left[1, 1+2 p, 2 (1+p), 1+\frac{b x^{1/3}}{a}\right]+$$
$$\frac{3 b^3 \left(1+\frac{b x^{1/3}}{a}\right) \left(a^2+2 a b x^{1/3}+b^2 x^{2/3}\right)^p \text{Hypergeometric2F1}\left[4, 1+2 p, 2 (1+p), 1+\frac{b x^{1/3}}{a}\right]}{a^3 (1+2 p)}$$

Test results for the 96 problems in "1.2.3.3 (d+e x^n)^q (a+b x^n+c x^(2 n))^p.m"

Test results for the 156 problems in "1.2.3.4 (f x)^m (d+e x^n)^q (a+b x^n+c x^(2 n))^p.m"

Test results for the 17 problems in "1.2.3.5 P(x) (d x)^m (a+b x^n+c x^(2 n))^p.m"

Test results for the 140 problems in "1.2.4.2 (d x)^m (a x^q+b x^n+c x^(2 n-q))^p.m"

Test results for the 494 problems in "1.3.1 Rational functions.m"

Problem 174: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(b x^{1+p} \left(b x+c x^3\right)^p+2 c x^{3+p} \left(b x+c x^3\right)^p\right) dx$$

Optimal (type 3, 27 leaves, ? steps):

$$\frac{x^{1+p} \left(b x + c x^3\right)^{1+p}}{2 (1+p)}$$

Result (type 5, 116 leaves, 7 steps):

$$\frac{b x^{2+p} \left(1+\frac{c x^2}{b}\right)^{-p} \left(b x + c x^3\right)^p \text{Hypergeometric2F1}\left[-p, 1+p, 2+p, -\frac{c x^2}{b}\right]}{2 (1+p)} + \frac{c x^{4+p} \left(1+\frac{c x^2}{b}\right)^{-p} \left(b x + c x^3\right)^p \text{Hypergeometric2F1}\left[-p, 2+p, 3+p, -\frac{c x^2}{b}\right]}{2+p}$$

Problem 221: Result valid but suboptimal antiderivative.

$$\int (1+2 x) \left(x+x^2\right)^3 \left(-18+7 \left(x+x^2\right)^3\right)^2 \, dx$$

Optimal (type 1, 33 leaves, ? steps):

$$81 x^4 (1+x)^4 - 36 x^7 (1+x)^7 + \frac{49}{10} x^{10} (1+x)^{10}$$

Result (type 1, 96 leaves, 3 steps):

$$81 x^4 + 324 x^5 + 486 x^6 + 288 x^7 - 171 x^8 - 756 x^9 - \frac{12551 x^{10}}{10} - 1211 x^{11} - \frac{1071 x^{12}}{2} + 336 x^{13} + 993 x^{14} + \frac{6174 x^{15}}{5} + 1029 x^{16} + 588 x^{17} + \frac{441 x^{18}}{2} + 49 x^{19} + \frac{49 x^{20}}{10}$$

Problem 222: Result valid but suboptimal antiderivative.

$$\int x^3 (1+x)^3 (1+2 x) \left(-18+7 x^3 (1+x)^3\right)^2 \, dx$$

Optimal (type 1, 33 leaves, ? steps):

$$81 x^4 (1+x)^4 - 36 x^7 (1+x)^7 + \frac{49}{10} x^{10} (1+x)^{10}$$

Result (type 1, 96 leaves, 2 steps):

$$81 x^4 + 324 x^5 + 486 x^6 + 288 x^7 - 171 x^8 - 756 x^9 - \frac{12551 x^{10}}{10} - 1211 x^{11} - \frac{1071 x^{12}}{2} + 336 x^{13} + 993 x^{14} + \frac{6174 x^{15}}{5} + 1029 x^{16} + 588 x^{17} + \frac{441 x^{18}}{2} + 49 x^{19} + \frac{49 x^{20}}{10}$$

Problem 329: Result valid but suboptimal antiderivative.

$$\int \frac{-20\,x+4\,x^2}{9-10\,x^2+x^4}\,dx$$

Optimal (type 3, 31 leaves, ? steps):

$$\text{Log}[1-x]-\frac{1}{2}\,\text{Log}[3-x]+\frac{3}{2}\,\text{Log}[1+x]-2\,\text{Log}[3+x]$$

Result (type 3, 41 leaves, 11 steps):

$$-\frac{3}{2}\,\text{ArcTanh}\left[\frac{x}{3}\right]+\frac{\text{ArcTanh}[x]}{2}+\frac{5}{4}\,\text{Log}\left[1-x^2\right]-\frac{5}{4}\,\text{Log}\left[9-x^2\right]$$

Problem 393: Unable to integrate problem.

$$\int \frac{\left(1+x^2\right)^2}{a\,x^6+b\,\left(1+x^2\right)^3}\,dx$$

Optimal (type 3, 168 leaves, ? steps):

$$\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}+b^{1/3}}\,x}{b^{1/6}}\right]}{3\,\sqrt{a^{1/3}+b^{1/3}}\,b^{5/6}}+\frac{\text{ArcTan}\left[\frac{\sqrt{-(-1)^{1/3}\,a^{1/3}+b^{1/3}}\,x}{b^{1/6}}\right]}{3\,\sqrt{-(-1)^{1/3}\,a^{1/3}+b^{1/3}}\,b^{5/6}}+\frac{\text{ArcTan}\left[\frac{\sqrt{(-1)^{2/3}\,a^{1/3}+b^{1/3}}\,x}{b^{1/6}}\right]}{3\,\sqrt{(-1)^{2/3}\,a^{1/3}+b^{1/3}}\,b^{5/6}}$$

Result (type 8, 68 leaves, 5 steps):

$$\text{CannotIntegrate}\left[\frac{1}{a\,x^6+b\,\left(1+x^2\right)^3},\,x\right]+2\,\text{CannotIntegrate}\left[\frac{x^2}{a\,x^6+b\,\left(1+x^2\right)^3},\,x\right]+\text{CannotIntegrate}\left[\frac{x^4}{a\,x^6+b\,\left(1+x^2\right)^3},\,x\right]$$

Problem 493: Unable to integrate problem.

$$\int \left(\frac{3\,\left(-47+228\,x+120\,x^2+19\,x^3\right)}{\left(3+x+x^4\right)^4}+\frac{42-320\,x-75\,x^2-8\,x^3}{\left(3+x+x^4\right)^3}+\frac{30\,x}{\left(3+x+x^4\right)^2}\right)dx$$

Optimal (type 1, 27 leaves, ? steps):

$$\frac{2-3\,x+5\,x^2+x^4-5\,x^6}{\left(3+x+x^4\right)^3}$$

Result (type 8, 121 leaves, 7 steps):

$$-\frac{19}{4\left(3+x+x^4\right)^3}+\frac{1}{\left(3+x+x^4\right)^2}-\frac{621}{4}\text{CannotIntegrate}\left[\frac{1}{\left(3+x+x^4\right)^4},x\right]+$$
$$684\,\text{CannotIntegrate}\left[\frac{x}{\left(3+x+x^4\right)^4},x\right]+360\,\text{CannotIntegrate}\left[\frac{x^2}{\left(3+x+x^4\right)^4},x\right]+44\,\text{CannotIntegrate}\left[\frac{1}{\left(3+x+x^4\right)^3},x\right]-$$
$$320\,\text{CannotIntegrate}\left[\frac{x}{\left(3+x+x^4\right)^3},x\right]-75\,\text{CannotIntegrate}\left[\frac{x^2}{\left(3+x+x^4\right)^3},x\right]+30\,\text{CannotIntegrate}\left[\frac{x}{\left(3+x+x^4\right)^2},x\right]$$

Problem 494: Unable to integrate problem.

$$\int\left(\frac{-3+10x+4x^3-30x^5}{\left(3+x+x^4\right)^3}-\frac{3\left(1+4x^3\right)\left(2-3x+5x^2+x^4-5x^6\right)}{\left(3+x+x^4\right)^4}\right)dx$$

Optimal (type 1, 27 leaves, ? steps):

$$\frac{2-3x+5x^2+x^4-5x^6}{\left(3+x+x^4\right)^3}$$

Result (type 8, 177 leaves, 13 steps):

$$\frac{7}{2\left(3+x+x^4\right)^3}-\frac{63x}{22\left(3+x+x^4\right)^3}-\frac{12x^2}{\left(3+x+x^4\right)^3}-\frac{5x^3}{\left(3+x+x^4\right)^3}+\frac{3x^4}{2\left(3+x+x^4\right)^3}-\frac{10x^6}{\left(3+x+x^4\right)^3}-$$
$$\frac{1}{2\left(3+x+x^4\right)^2}+\frac{5x^2}{\left(3+x+x^4\right)^2}+\frac{144}{11}\text{CannotIntegrate}\left[\frac{1}{\left(3+x+x^4\right)^4},x\right]+\frac{828}{11}\text{CannotIntegrate}\left[\frac{x}{\left(3+x+x^4\right)^4},x\right]+$$
$$18\,\text{CannotIntegrate}\left[\frac{x^2}{\left(3+x+x^4\right)^4},x\right]-4\,\text{CannotIntegrate}\left[\frac{1}{\left(3+x+x^4\right)^3},x\right]-20\,\text{CannotIntegrate}\left[\frac{x}{\left(3+x+x^4\right)^3},x\right]$$

Test results for the 1025 problems in "1.3.2 Algebraic functions.m"

Problem 197: Unable to integrate problem.

$$\int\frac{\left(d^3+e^3x^3\right)^p}{d+e\,x}\,dx$$

Optimal (type 6, 135 leaves, ? steps):

$$\frac{\left(d^3+e^3x^3\right)^p\left(1+\frac{2(d+e\,x)}{\left(-3+i\sqrt{3}\right)d}\right)^{-p}\left(1-\frac{2(d+e\,x)}{\left(3+i\sqrt{3}\right)d}\right)^{-p}\text{AppellF1}\left[p,-p,-p,1+p,-\frac{2(d+e\,x)}{\left(-3+i\sqrt{3}\right)d},\frac{2(d+e\,x)}{\left(3+i\sqrt{3}\right)d}\right]}{e\,p}$$

Result (type 8, 23 leaves, 0 steps):

$$\text{CannotIntegrate}\left[\frac{\left(d^3+e^3 x^3\right)^p}{d+e x}, x\right]$$

Problem 396: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \left(\frac{\sqrt{a x^{2 n}}}{\sqrt{1+x^n}}+\frac{2 x^{-n} \sqrt{a x^{2 n}}}{(2+n) \sqrt{1+x^n}}\right) dx$$

Optimal (type 3, 34 leaves, ? steps):

$$\frac{2 x^{1-n} \sqrt{a x^{2 n}} \sqrt{1+x^n}}{2+n}$$

Result (type 5, 80 leaves, 5 steps):

$$\frac{x \sqrt{a x^{2 n}} \text{Hypergeometric2F1}\left[\frac{1}{2}, 1+\frac{1}{n}, 2+\frac{1}{n}, -x^n\right]}{1+n}+\frac{2 x^{1-n} \sqrt{a x^{2 n}} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{n}, 1+\frac{1}{n}, -x^n\right]}{2+n}$$

Problem 616: Unable to integrate problem.

$$\int \frac{1}{x^2}\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n \left(-a d+(b d m+a e n) x+(c d+b e+a f+2 c d m+b e m+b e n+2 a f n) x^2+ (2 c e+2 b f+2 a g+2 c e m+b f m+c e n+2 b f n+3 a g n) x^3+(3 c f+3 b g+2 c f m+b g m+2 c f n+3 b g n) x^4+c g (4+2 m+3 n) x^5\right) dx$$

Optimal (type 3, 37 leaves, ? steps):

$$\frac{\left(a+b x+c x^2\right)^{1+m} \left(d+e x+f x^2+g x^3\right)^{1+n}}{x}$$

Result (type 8, 306 leaves, 2 steps):

$$(c (d+2 d m)+b e (1+m+n)+a f (1+2 n)) \text{CannotIntegrate}\left[\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]-a d \text{CannotIntegrate}\left[\frac{\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n}{x^2}, x\right]+(b d m+a e n) \text{CannotIntegrate}\left[\frac{\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n}{x}, x\right]+(c e (2+2 m+n)+b f (2+m+2 n)+a g (2+3 n)) \text{CannotIntegrate}\left[x \left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]+(c f (3+2 m+2 n)+b g (3+m+3 n)) \text{CannotIntegrate}\left[x^2 \left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]+c g (4+2 m+3 n) \text{CannotIntegrate}\left[x^3 \left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]$$

Problem 617: Unable to integrate problem.

$$\int \frac{1}{x^3}\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n \left(-2 a d+(-b d-a e+b d m+a e n) x+(2 c d m+b e m+b e n+2 a f n) x^2+(c e+b f+a g+2 c e m+b f m+c e n+2 b f n+3 a g n) x^3+(2 c f+2 b g+2 c f m+b g m+2 c f n+3 b g n) x^4+c g (3+2 m+3 n) x^5\right) dx$$

Optimal (type 3, 37 leaves, ? steps):

$$\frac{\left(a+b x+c x^2\right)^{1+m} \left(d+e x+f x^2+g x^3\right)^{1+n}}{x^2}$$

Result (type 8, 305 leaves, 2 steps):

$$(c e (1+2 m+n)+b f (1+m+2 n)+a g (1+3 n)) \text{CannotIntegrate}\left[\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]-2 a d \text{CannotIntegrate}\left[\frac{\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n}{x^3}, x\right]-(b d (1-m)+a e (1-n)) \text{CannotIntegrate}\left[\frac{\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n}{x^2}, x\right]+(2 c d m+2 a f n+b e (m+n)) \text{CannotIntegrate}\left[\frac{\left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n}{x}, x\right]+(2 c f (1+m+n)+b g (2+m+3 n)) \text{CannotIntegrate}\left[x \left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]+c g (3+2 m+3 n) \text{CannotIntegrate}\left[x^2 \left(a+b x+c x^2\right)^m \left(d+e x+f x^2+g x^3\right)^n, x\right]$$

Problem 941: Result unnecessarily involves higher level functions.

$$\int \left(\left(1-x^6\right)^{2/3}+\frac{\left(1-x^6\right)^{2/3}}{x^6}\right) dx$$

Optimal (type 2, 35 leaves, ? steps):

$$-\frac{\left(1-x^6\right)^{2/3}}{5 x^5}+\frac{1}{5} x \left(1-x^6\right)^{2/3}$$

Result (type 5, 36 leaves, 3 steps):

$$-\frac{\text{Hypergeometric2F1}\left[-\frac{5}{6},-\frac{2}{3},\frac{1}{6},x^6\right]}{5 x^5}+x \text{Hypergeometric2F1}\left[-\frac{2}{3},\frac{1}{6},\frac{7}{6},x^6\right]$$

Problem 995: Unable to integrate problem.

$$\int \sqrt{1 - x^2 + x \sqrt{-1 + x^2}} \, dx$$

Optimal (type 3, 63 leaves, ? steps):

$$\frac{1}{4} \left(3 x + \sqrt{-1 + x^2}\right) \sqrt{1 - x^2 + x \sqrt{-1 + x^2}} + \frac{3 \operatorname{ArcSin}\left[x - \sqrt{-1 + x^2}\right]}{4 \sqrt{2}}$$

Result (type 8, 24 leaves, 0 steps):

$$\text{CannotIntegrate}\left[\sqrt{1 - x^2 + x \sqrt{-1 + x^2}}, x\right]$$

Problem 996: Unable to integrate problem.

$$\int \frac{\sqrt{-x + \sqrt{x} \sqrt{1 + x}}}{\sqrt{1 + x}} \, dx$$

Optimal (type 3, 66 leaves, ? steps):

$$\frac{1}{2} \left(\sqrt{x} + 3 \sqrt{1 + x}\right) \sqrt{-x + \sqrt{x} \sqrt{1 + x}} - \frac{3 \operatorname{ArcSin}\left[\sqrt{x} - \sqrt{1 + x}\right]}{2 \sqrt{2}}$$

Result (type 8, 31 leaves, 1 step):

$$\text{CannotIntegrate}\left[\frac{\sqrt{-x + \sqrt{x} \sqrt{1 + x}}}{\sqrt{1 + x}}, x\right]$$

Problem 997: Result valid but suboptimal antiderivative.

$$\int -\frac{x + 2 \sqrt{1 + x^2}}{x + x^3 + \sqrt{1 + x^2}} \, dx$$

Optimal (type 3, 78 leaves, ? steps):

$$-\sqrt{2 \left(1 + \sqrt{5}\right)} \operatorname{ArcTan}\left[\sqrt{-2 + \sqrt{5}} \left(x + \sqrt{1 + x^2}\right)\right] + \sqrt{2 \left(-1 + \sqrt{5}\right)} \operatorname{ArcTanh}\left[\sqrt{2 + \sqrt{5}} \left(x + \sqrt{1 + x^2}\right)\right]$$

Result (type 3, 319 leaves, 25 steps):

$$-2\sqrt{\frac{2}{5\left(1+\sqrt{5}\right)}}\;\text{ArcTan}\left[\sqrt{\frac{2}{1+\sqrt{5}}}\;x\right]-\sqrt{\frac{1}{10}\left(1+\sqrt{5}\right)}\;\text{ArcTan}\left[\sqrt{\frac{2}{1+\sqrt{5}}}\;x\right]-\sqrt{\frac{2}{5\left(-1+\sqrt{5}\right)}}\;\text{ArcTan}\left[\sqrt{\frac{2}{-1+\sqrt{5}}}\;\sqrt{1+x^2}\right]-$$

$$\sqrt{\frac{2}{5}\left(-1+\sqrt{5}\right)}\;\text{ArcTan}\left[\sqrt{\frac{2}{-1+\sqrt{5}}}\;\sqrt{1+x^2}\right]-2\sqrt{\frac{2}{5\left(-1+\sqrt{5}\right)}}\;\text{ArcTanh}\left[\sqrt{\frac{2}{-1+\sqrt{5}}}\;x\right]+$$

$$\sqrt{\frac{1}{10}\left(-1+\sqrt{5}\right)}\;\text{ArcTanh}\left[\sqrt{\frac{2}{-1+\sqrt{5}}}\;x\right]-\sqrt{\frac{2}{5\left(1+\sqrt{5}\right)}}\;\text{ArcTanh}\left[\sqrt{\frac{2}{1+\sqrt{5}}}\;\sqrt{1+x^2}\right]+\sqrt{\frac{2}{5}\left(1+\sqrt{5}\right)}\;\text{ArcTanh}\left[\sqrt{\frac{2}{1+\sqrt{5}}}\;\sqrt{1+x^2}\right]$$

Problem 1017: Result valid but suboptimal antiderivative.

$$\int\frac{1-x^2}{\left(1-x+x^2\right)\left(1-x^3\right)^{2/3}}\,dx$$

Optimal (type 3, 103 leaves, ? steps):

$$\frac{\sqrt{3}\;\text{ArcTan}\left[\frac{1-\frac{2\,2^{1/3}(1-x)}{\left(1-x^3\right)^{1/3}}}{\sqrt{3}}\right]}{2^{2/3}}-\frac{\text{Log}\left[1+2\left(1-x\right)^3-x^3\right]}{2\times2^{2/3}}+\frac{3\,\text{Log}\left[2^{1/3}\left(1-x\right)+\left(1-x^3\right)^{1/3}\right]}{2\times2^{2/3}}$$

Result (type 3, 425 leaves, 42 steps):

$$\frac{2^{1/3}\;\text{ArcTan}\left[\frac{1-\frac{2\times2^{1/3}(1-x)}{\left(1-x^3\right)^{1/3}}}{\sqrt{3}}\right]}{\sqrt{3}}+\frac{\text{ArcTan}\left[\frac{1+\frac{2^{1/3}(1-x)}{\left(1-x^3\right)^{1/3}}}{\sqrt{3}}\right]}{2^{2/3}\sqrt{3}}-\frac{\text{ArcTan}\left[\frac{1-\frac{2\times2^{1/3}x}{\left(1-x^3\right)^{1/3}}}{\sqrt{3}}\right]}{2^{2/3}\sqrt{3}}+\frac{\text{ArcTan}\left[\frac{1+2^{2/3}\left(1-x^3\right)^{1/3}}{\sqrt{3}}\right]}{2^{2/3}\sqrt{3}}+\frac{\text{Log}\left[1+x^3\right]}{3\times2^{2/3}}+\frac{\text{Log}\left[2^{2/3}-\frac{1-x}{\left(1-x^3\right)^{1/3}}\right]}{3\times2^{2/3}}-$$

$$\frac{\text{Log}\left[1+\frac{2^{2/3}(1-x)^2}{\left(1-x^3\right)^{2/3}}-\frac{2^{1/3}(1-x)}{\left(1-x^3\right)^{1/3}}\right]}{3\times2^{2/3}}+\frac{1}{3}\times2^{1/3}\,\text{Log}\left[1+\frac{2^{1/3}\left(1-x\right)}{\left(1-x^3\right)^{1/3}}\right]-\frac{\text{Log}\left[2\times2^{1/3}+\frac{(1-x)^2}{\left(1-x^3\right)^{2/3}}+\frac{2^{2/3}(1-x)}{\left(1-x^3\right)^{1/3}}\right]}{6\times2^{2/3}}-\frac{\text{Log}\left[2^{1/3}-\left(1-x^3\right)^{1/3}\right]}{2\times2^{2/3}}-\frac{\text{Log}\left[-2^{1/3}x-\left(1-x^3\right)^{1/3}\right]}{2\times2^{2/3}}$$

Problem 1018: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{x^2}{\sqrt{-1+x^4}\left(1+x^4\right)}\,dx$$

Optimal (type 3, 49 leaves, ? steps):

$$-\frac{1}{4}\,\text{ArcTan}\left[\frac{1+x^2}{x\sqrt{-1+x^4}}\right]-\frac{1}{4}\,\text{ArcTanh}\left[\frac{1-x^2}{x\sqrt{-1+x^4}}\right]$$

Result (type 3, 47 leaves, 9 steps):

$$\left(-\frac{1}{8}-\frac{i}{8}\right) \text{ArcTan}\left[\frac{(1+i)\, x}{\sqrt{-1+x^4}}\right]+\left(\frac{1}{8}+\frac{i}{8}\right) \text{ArcTanh}\left[\frac{(1+i)\, x}{\sqrt{-1+x^4}}\right]$$

Problem 1023: Unable to integrate problem.

$$\int \left(1+x+x^2+x^3\right)^{-n} \left(1-x^4\right)^n \, dx$$

Optimal (type 3, 34 leaves, ? steps):

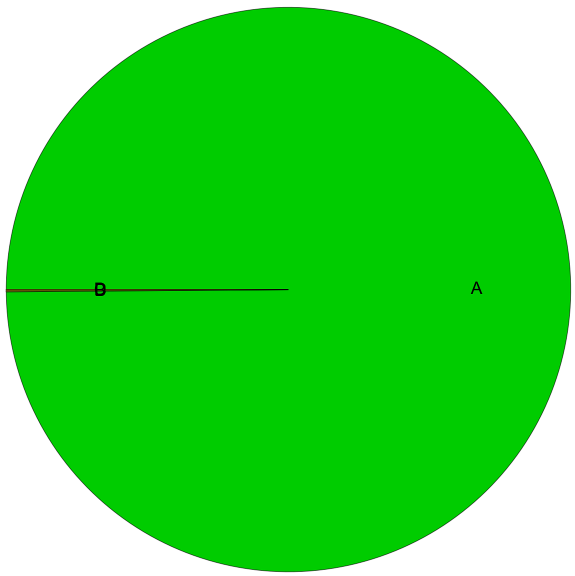
$$-\frac{(1-x) \left(1+x+x^2+x^3\right)^{-n} \left(1-x^4\right)^n}{1+n}$$

Result (type 8, 25 leaves, 0 steps):

$$\text{CannotIntegrate}\left[\left(1+x+x^2+x^3\right)^{-n} \left(1-x^4\right)^n, x\right]$$

Summary of Integration Test Results

26125 integration problems



A - 26092 optimal antiderivatives

B - 9 valid but suboptimal antiderivatives

C - 13 unnecessarily complex antiderivatives

D - 11 unable to integrate problems

E - 0 integration timeouts

F - 0 invalid antiderivatives