Mathematica 11.3 Integration Test Results

on the problems in the test-suite directory "8 Special functions"

Test results for the 97 problems in "8.10 Formal derivatives.m"

Problem 30: Result more than twice size of optimal antiderivative.

$$\int \frac{g[x]\, f'[x] + f[x]\, g'[x]}{1 - f[x]^2\, g[x]^2}\, dx$$

Optimal (type 9, 6 leaves, 2 steps):

ArcTanh[f[x] g[x]]

Result (type 9, 26 leaves):

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

Problem 31: Result more than twice size of optimal antiderivative.

$$\int \frac{-g[x]\, f'[x] + f[x]\, g'[x]}{f[x]^2 - g[x]^2}\, dx$$

Optimal (type 9, 8 leaves, 2 steps):

$$\text{ArcTanh}\left[\frac{f[x]}{g[x]}\right]$$

Result (type 9, 23 leaves):

$$-\frac{1}{2}\text{Log}[f[x] - g[x]] + \frac{1}{2}\text{Log}[f[x] + g[x]]$$

Problem 32: Result more than twice size of optimal antiderivative.

$$\int \frac{f[x]^{-1+m}\, g[x]^{-1+n}\, \left(m\, g[x]\, f'[x] + n\, f[x]\, g'[x]\right)}{1 - f[x]^{2m}\, g[x]^{2n}}\, dx$$

Optimal (type 9, 10 leaves, 2 steps):

$$\text{ArcTanh}\left[f[x]^m\, g[x]^n\right]$$

Result (type 9, 34 leaves):

$$-\frac{1}{2}\, \text{Log}\left[1 - f[x]^m\, g[x]^n\right] + \frac{1}{2}\, \text{Log}\left[1 + f[x]^m\, g[x]^n\right]$$

Problem 33: Result more than twice size of optimal antiderivative.

$$\int \frac{f[x]^{-1+m}\, g[x]^{-1+n}\, \left(-m\, g[x]\, f'[x] + n\, f[x]\, g'[x]\right)}{f[x]^{2m} - g[x]^{2n}}\, dx$$

Optimal (type 9, 12 leaves, 3 steps):

$$\text{ArcTanh}\left[f[x]^{-m}\, g[x]^n\right]$$

Result (type 9, 31 leaves):

$$-\frac{1}{2}\, \text{Log}\left[f[x]^m - g[x]^n\right] + \frac{1}{2}\, \text{Log}\left[f[x]^m + g[x]^n\right]$$

Problem 34: Result more than twice size of optimal antiderivative.

$$\int \frac{f[x]^{-1+m}\, g[x]^{-1-n}\, \left(-m\, g[x]\, f'[x] - n\, f[x]\, g'[x]\right)}{f[x]^{2m} - g[x]^{-2n}}\, dx$$

Optimal (type 9, 14 leaves, 3 steps):

$$\text{ArcTanh}\left[f[x]^{-m}\, g[x]^{-n}\right]$$

Result (type 9, 34 leaves):

$$-\frac{1}{2}\, \text{Log}\left[1 - f[x]^m\, g[x]^n\right] + \frac{1}{2}\, \text{Log}\left[1 + f[x]^m\, g[x]^n\right]$$

Problem 43: Result more than twice size of optimal antiderivative.

$$\int \left(\cos[x]\, g\left[e^x\right] f'[\sin[x]] + e^x f[\sin[x]]\, g'\left[e^x\right]\right) dx$$

Optimal (type 9, 8 leaves, ? steps):

$$f[\sin[x]]\, g\left[e^x\right]$$

Result (type 9, 28 leaves) :

$$\int \left(\cos[x]\, g\left[e^x\right] f'[\sin[x]] + e^x f[\sin[x]]\, g'\left[e^x\right]\right) dx$$

Test results for the 311 problems in "8.1 Error functions.m"

Problem 26: Unable to integrate problem.

$$\int \frac{\text{Erf}[b\,x]^2}{x^3}\, dx$$

Optimal (type 4, 67 leaves, 5 steps) :

$$-\frac{2\, b\, e^{-b^2 x^2}\, \text{Erf}[b\,x]}{\sqrt{\pi}\, x} - b^2\, \text{Erf}[b\,x]^2 - \frac{\text{Erf}[b\,x]^2}{2\, x^2} + \frac{2\, b^2\, \text{ExpIntegralEi}\left[-2\, b^2\, x^2\right]}{\pi}$$

Result (type 8, 12 leaves) :

$$\int \frac{\text{Erf}[b\,x]^2}{x^3}\, dx$$

Problem 27: Unable to integrate problem.

$$\int \frac{\text{Erf}[b\,x]^2}{x^5}\, dx$$

Optimal (type 4, 125 leaves, 8 steps) :

$$-\frac{b^2\, e^{-2\, b^2 x^2}}{3\, \pi\, x^2} - \frac{b\, e^{-b^2 x^2}\, \text{Erf}[b\,x]}{3\, \sqrt{\pi}\, x^3} + \frac{2\, b^3\, e^{-b^2 x^2}\, \text{Erf}[b\,x]}{3\, \sqrt{\pi}\, x} + \frac{1}{3}\, b^4\, \text{Erf}[b\,x]^2 - \frac{\text{Erf}[b\,x]^2}{4\, x^4} - \frac{4\, b^4\, \text{ExpIntegralEi}\left[-2\, b^2\, x^2\right]}{3\, \pi}$$

Result (type 8, 12 leaves) :

$$\int \frac{\text{Erf}[b\,x]^2}{x^5}\,dx$$

Problem 28: Unable to integrate problem.

$$\int \frac{\text{Erf}[b\,x]^2}{x^7}\,dx$$

Optimal (type 4, 177 leaves, 12 steps) :

$$-\frac{b^2\,e^{-2\,b^2\,x^2}}{15\,\pi\,x^4}+\frac{2\,b^4\,e^{-2\,b^2\,x^2}}{9\,\pi\,x^2}-\frac{2\,b\,e^{-b^2\,x^2}\,\text{Erf}[b\,x]}{15\,\sqrt{\pi}\,x^5}+\frac{4\,b^3\,e^{-b^2\,x^2}\,\text{Erf}[b\,x]}{45\,\sqrt{\pi}\,x^3}-\frac{8\,b^5\,e^{-b^2\,x^2}\,\text{Erf}[b\,x]}{45\,\sqrt{\pi}\,x}-\frac{4}{45}\,b^6\,\text{Erf}[b\,x]^2-\frac{\text{Erf}[b\,x]^2}{6\,x^6}+\frac{28\,b^6\,\text{ExpIntegralEi}\left[-2\,b^2\,x^2\right]}{45\,\pi}$$

Result (type 8, 12 leaves) :

$$\int \frac{\text{Erf}[b\,x]^2}{x^7}\,dx$$

Problem 72: Unable to integrate problem.

$$\int e^{c+b^2\,x^2}\,\text{Erf}[b\,x]\,dx$$

Optimal (type 5, 29 leaves, 1 step) :

$$\frac{b\,e^c\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},b^2\,x^2\right]}{\sqrt{\pi}}$$

Result (type 8, 18 leaves) :

$$\int e^{c+b^2\,x^2}\,\text{Erf}[b\,x]\,dx$$

Problem 98: Unable to integrate problem.

$$\int \text{Cos}\left[c+i\,b^2\,x^2\right]\,\text{Erf}[b\,x]\,dx$$

Optimal (type 5, 62 leaves, 4 steps) :

$$\frac{e^{i\,c}\,\sqrt{\pi}\,\text{Erf}[b\,x]^2}{8\,b}+\frac{b\,e^{-i\,c}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},b^2\,x^2\right]}{2\,\sqrt{\pi}}$$

Result (type 8, 20 leaves):

$$\int \mathrm{Cos}\left[c + i\, b^2 x^2\right] \mathrm{Erf}[b\, x]\, dx$$

Problem 99: Unable to integrate problem.

$$\int \mathrm{Cos}\left[c - i\, b^2 x^2\right] \mathrm{Erf}[b\, x]\, dx$$

Optimal (type 5, 62 leaves, 4 steps):

$$\frac{e^{-i c} \sqrt{\pi}\, \mathrm{Erf}[b\, x]^2}{8\, b} + \frac{b\, e^{i c} x^2\, \mathrm{HypergeometricPFQ}\left[\{1, 1\}, \left\{\frac{3}{2}, 2\right\}, b^2 x^2\right]}{2 \sqrt{\pi}}$$

Result (type 8, 20 leaves):

$$\int \mathrm{Cos}\left[c - i\, b^2 x^2\right] \mathrm{Erf}[b\, x]\, dx$$

Problem 129: Unable to integrate problem.

$$\int \frac{\mathrm{Erfc}[b\, x]^2}{x^3}\, dx$$

Optimal (type 4, 67 leaves, 5 steps):

$$\frac{2\, b\, e^{-b^2 x^2}\, \mathrm{Erfc}[b\, x]}{\sqrt{\pi}\, x} - b^2\, \mathrm{Erfc}[b\, x]^2 - \frac{\mathrm{Erfc}[b\, x]^2}{2\, x^2} + \frac{2\, b^2\, \mathrm{ExpIntegralEi}\left[-2\, b^2 x^2\right]}{\pi}$$

Result (type 8, 12 leaves):

$$\int \frac{\mathrm{Erfc}[b\, x]^2}{x^3}\, dx$$

Problem 130: Unable to integrate problem.

$$\int \frac{\mathrm{Erfc}[b\, x]^2}{x^5}\, dx$$

Optimal (type 4, 125 leaves, 8 steps):

$$-\frac{b^2\, e^{-2 b^2 x^2}}{3\, \pi\, x^2} + \frac{b\, e^{-b^2 x^2}\, \mathrm{Erfc}[b\, x]}{3 \sqrt{\pi}\, x^3} - \frac{2\, b^3\, e^{-b^2 x^2}\, \mathrm{Erfc}[b\, x]}{3 \sqrt{\pi}\, x} + \frac{1}{3} b^4\, \mathrm{Erfc}[b\, x]^2 - \frac{\mathrm{Erfc}[b\, x]^2}{4\, x^4} - \frac{4\, b^4\, \mathrm{ExpIntegralEi}\left[-2\, b^2 x^2\right]}{3\, \pi}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{Erfc}[b\,x]^2}{x^5}\,dx$$

Problem 131: Unable to integrate problem.

$$\int \frac{\text{Erfc}[b\,x]^2}{x^7}\,dx$$

Optimal (type 4, 177 leaves, 12 steps):

$$-\frac{b^2\,e^{-2\,b^2\,x^2}}{15\,\pi\,x^4}+\frac{2\,b^4\,e^{-2\,b^2\,x^2}}{9\,\pi\,x^2}+\frac{2\,b\,e^{-b^2\,x^2}\,\text{Erfc}[b\,x]}{15\,\sqrt{\pi}\,x^5}-\frac{4\,b^3\,e^{-b^2\,x^2}\,\text{Erfc}[b\,x]}{45\,\sqrt{\pi}\,x^3}+\frac{8\,b^5\,e^{-b^2\,x^2}\,\text{Erfc}[b\,x]}{45\,\sqrt{\pi}\,x}-\frac{4}{45}\,b^6\,\text{Erfc}[b\,x]^2-\frac{\text{Erfc}[b\,x]^2}{6\,x^6}+\frac{28\,b^6\,\text{ExpIntegralEi}\left[-2\,b^2\,x^2\right]}{45\,\pi}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{Erfc}[b\,x]^2}{x^7}\,dx$$

Problem 138: Unable to integrate problem.

$$\int (c+d\,x)^2\,\text{Erfc}[a+b\,x]^2\,dx$$

Optimal (type 4, 375 leaves, 16 steps):

$$\frac{d\,(b\,c-a\,d)\,e^{-2\,(a+b\,x)^2}}{b^3\,\pi}+\frac{d^2\,e^{-2\,(a+b\,x)^2}\,(a+b\,x)}{3\,b^3\,\pi}-\frac{(b\,c-a\,d)^2\,\sqrt{\frac{2}{\pi}}\,\text{Erf}\left[\sqrt{2}\,(a+b\,x)\right]}{b^3}-\frac{5\,d^2\,\text{Erf}\left[\sqrt{2}\,(a+b\,x)\right]}{6\,b^3\,\sqrt{2\,\pi}}-\frac{2\,d^2\,e^{-(a+b\,x)^2}\,\text{Erfc}[a+b\,x]}{3\,b^3\,\sqrt{\pi}}-\frac{2\,(b\,c-a\,d)^2\,e^{-(a+b\,x)^2}\,\text{Erfc}[a+b\,x]}{b^3\,\sqrt{\pi}}-\frac{2\,d\,(b\,c-a\,d)\,e^{-(a+b\,x)^2}\,(a+b\,x)\,\text{Erfc}[a+b\,x]}{b^3\,\sqrt{\pi}}-\frac{2\,d^2\,e^{-(a+b\,x)^2}\,(a+b\,x)^2\,\text{Erfc}[a+b\,x]}{3\,b^3\,\sqrt{\pi}}-\frac{d\,(b\,c-a\,d)\,\text{Erfc}[a+b\,x]^2}{2\,b^3}+\frac{(b\,c-a\,d)^2\,(a+b\,x)\,\text{Erfc}[a+b\,x]^2}{b^3}+\frac{d\,(b\,c-a\,d)\,(a+b\,x)^2\,\text{Erfc}[a+b\,x]^2}{b^3}+\frac{d^2\,(a+b\,x)^3\,\text{Erfc}[a+b\,x]^2}{3\,b^3}$$

Result (type 8, 18 leaves):

$$\int (c+d\,x)^2\,\text{Erfc}[a+b\,x]^2\,dx$$

Problem 175: Unable to integrate problem.

$$\int e^{c+b^2 x^2}\,\text{Erfc}[b\,x]\,dx$$

Optimal (type 5, 50 leaves, 3 steps):

$$\frac{e^c\sqrt{\pi}\,\text{Erfi}[b\,x]}{2\,b}-\frac{b\,e^c\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},b^2\,x^2\right]}{\sqrt{\pi}}$$

Result (type 8, 18 leaves):

$$\int e^{c+b^2 x^2}\,\text{Erfc}[b\,x]\,dx$$

Problem 201: Unable to integrate problem.

$$\int \text{Cos}\left[c+i\,b^2\,x^2\right]\,\text{Erfc}[b\,x]\,dx$$

Optimal (type 5, 85 leaves, 6 steps):

$$-\frac{e^{i\,c}\sqrt{\pi}\,\text{Erfc}[b\,x]^2}{8\,b}+\frac{e^{-i\,c}\sqrt{\pi}\,\text{Erfi}[b\,x]}{4\,b}-\frac{b\,e^{-i\,c}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},b^2\,x^2\right]}{2\sqrt{\pi}}$$

Result (type 8, 20 leaves):

$$\int \text{Cos}\left[c+i\,b^2\,x^2\right]\,\text{Erfc}[b\,x]\,dx$$

Problem 202: Unable to integrate problem.

$$\int \text{Cos}\left[c-i\,b^2\,x^2\right]\,\text{Erfc}[b\,x]\,dx$$

Optimal (type 5, 85 leaves, 6 steps):

$$-\frac{e^{-i\,c}\sqrt{\pi}\,\text{Erfc}[b\,x]^2}{8\,b}+\frac{e^{i\,c}\sqrt{\pi}\,\text{Erfi}[b\,x]}{4\,b}-\frac{b\,e^{i\,c}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},b^2\,x^2\right]}{2\sqrt{\pi}}$$

Result (type 8, 20 leaves):

$$\int \text{Cos}\left[c-i\,b^2\,x^2\right]\,\text{Erfc}[b\,x]\,dx$$

Problem 228: Unable to integrate problem.

$$\int x^5 \,\text{Erfi}[b x]^2 \,dx$$

Optimal (type 4, 175 leaves, 12 steps):

$$\frac{11 e^{2 b^2 x^2}}{12 b^6 \pi} - \frac{7 e^{2 b^2 x^2} x^2}{12 b^4 \pi} + \frac{e^{2 b^2 x^2} x^4}{6 b^2 \pi} - \frac{5 e^{b^2 x^2} x \,\text{Erfi}[b x]}{4 b^5 \sqrt{\pi}} + \frac{5 e^{b^2 x^2} x^3 \,\text{Erfi}[b x]}{6 b^3 \sqrt{\pi}} - \frac{e^{b^2 x^2} x^5 \,\text{Erfi}[b x]}{3 b \sqrt{\pi}} + \frac{5 \,\text{Erfi}[b x]^2}{16 b^6} + \frac{1}{6} x^6 \,\text{Erfi}[b x]^2$$

Result (type 8, 12 leaves):

$$\int x^5 \,\text{Erfi}[b x]^2 \,dx$$

Problem 229: Unable to integrate problem.

$$\int x^3 \,\text{Erfi}[b x]^2 \,dx$$

Optimal (type 4, 124 leaves, 8 steps):

$$-\frac{e^{2 b^2 x^2}}{2 b^4 \pi} + \frac{e^{2 b^2 x^2} x^2}{4 b^2 \pi} + \frac{3 e^{b^2 x^2} x \,\text{Erfi}[b x]}{4 b^3 \sqrt{\pi}} - \frac{e^{b^2 x^2} x^3 \,\text{Erfi}[b x]}{2 b \sqrt{\pi}} - \frac{3 \,\text{Erfi}[b x]^2}{16 b^4} + \frac{1}{4} x^4 \,\text{Erfi}[b x]^2$$

Result (type 8, 12 leaves):

$$\int x^3 \,\text{Erfi}[b x]^2 \,dx$$

Problem 230: Unable to integrate problem.

$$\int x \,\text{Erfi}[b x]^2 \,dx$$

Optimal (type 4, 71 leaves, 5 steps):

$$\frac{e^{2 b^2 x^2}}{2 b^2 \pi} - \frac{e^{b^2 x^2} x \,\text{Erfi}[b x]}{b \sqrt{\pi}} + \frac{\text{Erfi}[b x]^2}{4 b^2} + \frac{1}{2} x^2 \,\text{Erfi}[b x]^2$$

Result (type 8, 10 leaves):

$$\int x \,\text{Erfi}[b x]^2 \,dx$$

Problem 232: Unable to integrate problem.

$$\int \frac{\text{Erfi}[b x]^2}{x^3} \, dx$$

Optimal (type 4, 65 leaves, 5 steps):

$$-\frac{2 b e^{b^2 x^2} \text{Erfi}[b x]}{\sqrt{\pi} x}+b^2 \text{Erfi}[b x]^2-\frac{\text{Erfi}[b x]^2}{2 x^2}+\frac{2 b^2 \text{ExpIntegralEi}\left[2 b^2 x^2\right]}{\pi}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{Erfi}[b x]^2}{x^3} \, dx$$

Problem 233: Unable to integrate problem.

$$\int \frac{\text{Erfi}[b x]^2}{x^5} \, dx$$

Optimal (type 4, 123 leaves, 8 steps):

$$-\frac{b^2 e^{2 b^2 x^2}}{3 \pi x^2}-\frac{b e^{b^2 x^2} \text{Erfi}[b x]}{3 \sqrt{\pi} x^3}-\frac{2 b^3 e^{b^2 x^2} \text{Erfi}[b x]}{3 \sqrt{\pi} x}+\frac{1}{3} b^4 \text{Erfi}[b x]^2-\frac{\text{Erfi}[b x]^2}{4 x^4}+\frac{4 b^4 \text{ExpIntegralEi}\left[2 b^2 x^2\right]}{3 \pi}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{Erfi}[b x]^2}{x^5} \, dx$$

Problem 234: Unable to integrate problem.

$$\int \frac{\text{Erfi}[b x]^2}{x^7} \, dx$$

Optimal (type 4, 174 leaves, 12 steps):

$$-\frac{b^2 e^{2 b^2 x^2}}{15 \pi x^4}-\frac{2 b^4 e^{2 b^2 x^2}}{9 \pi x^2}-\frac{2 b e^{b^2 x^2} \text{Erfi}[b x]}{15 \sqrt{\pi} x^5}-\frac{4 b^3 e^{b^2 x^2} \text{Erfi}[b x]}{45 \sqrt{\pi} x^3}-$$
$$\frac{8 b^5 e^{b^2 x^2} \text{Erfi}[b x]}{45 \sqrt{\pi} x}+\frac{4}{45} b^6 \text{Erfi}[b x]^2-\frac{\text{Erfi}[b x]^2}{6 x^6}+\frac{28 b^6 \text{ExpIntegralEi}\left[2 b^2 x^2\right]}{45 \pi}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{Erfi}[b\,x]^2}{x^7}\,dx$$

Problem 241: Unable to integrate problem.

$$\int (c+d\,x)^2\,\text{Erfi}[a+b\,x]^2\,dx$$

Optimal (type 4, 366 leaves, 16 steps):

$$\frac{d\,(b\,c-a\,d)\,e^{2\,(a+b\,x)^2}}{b^3\,\pi}+\frac{d^2\,e^{2\,(a+b\,x)^2}\,(a+b\,x)}{3\,b^3\,\pi}+\frac{2\,d^2\,e^{(a+b\,x)^2}\,\text{Erfi}[a+b\,x]}{3\,b^3\,\sqrt{\pi}}-\frac{2\,(b\,c-a\,d)^2\,e^{(a+b\,x)^2}\,\text{Erfi}[a+b\,x]}{b^3\,\sqrt{\pi}}-\frac{2\,d\,(b\,c-a\,d)\,e^{(a+b\,x)^2}\,(a+b\,x)\,\text{Erfi}[a+b\,x]}{b^3\,\sqrt{\pi}}-\frac{2\,d^2\,e^{(a+b\,x)^2}\,(a+b\,x)^2\,\text{Erfi}[a+b\,x]}{3\,b^3\,\sqrt{\pi}}+\frac{d\,(b\,c-a\,d)\,\text{Erfi}[a+b\,x]^2}{2\,b^3}+\frac{(b\,c-a\,d)^2\,(a+b\,x)\,\text{Erfi}[a+b\,x]^2}{b^3}+\frac{d\,(b\,c-a\,d)\,(a+b\,x)^2\,\text{Erfi}[a+b\,x]^2}{b^3}+\frac{d^2\,(a+b\,x)^3\,\text{Erfi}[a+b\,x]^2}{3\,b^3}+\frac{(b\,c-a\,d)^2\,\sqrt{\frac{2}{\pi}}\,\text{Erfi}\left[\sqrt{2}\,(a+b\,x)\right]}{b^3}-\frac{5\,d^2\,\text{Erfi}\left[\sqrt{2}\,(a+b\,x)\right]}{6\,b^3\,\sqrt{2\,\pi}}$$

Result (type 8, 18 leaves):

$$\int (c+d\,x)^2\,\text{Erfi}[a+b\,x]^2\,dx$$

Problem 242: Result unnecessarily involves imaginary or complex numbers.

$$\int (c+d\,x)\,\text{Erfi}[a+b\,x]^2\,dx$$

Optimal (type 4, 184 leaves, 10 steps):

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

Result (type 4, 189 leaves):

$$\frac{1}{4 b^2 \pi}\Big(\big(4 a b c + d - 2 a^2 d\big) \pi \,\text{Erfc}\big[-\text{i} (a + b x)\big] \,\text{Erfc}\big[\text{i} (a + b x)\big] + 2 \Big(d e^{2 (a+b x)^2} + 4 a b c \pi + d \pi - 2 a^2 d \pi + 2 \text{i} b c \sqrt{2 \pi} - 2 \text{i} a d \sqrt{2 \pi} - 2 e^{(a+b x)^2} \sqrt{\pi} (2 b c - a d + b d x) \,\text{Erfi}[a + b x] + b^2 \pi x (2 c + d x) \,\text{Erfi}[a + b x]^2 + 2 (b c - a d) \sqrt{2 \pi} \,\text{Erfi}\big[\sqrt{2} (a + b x)\big]\Big)\Big)$$

Problem 280: Unable to integrate problem.

$$\int \frac{e^{-b^2 x^2} \,\text{Erfi}[b x]}{x^2} \, dx$$

Optimal (type 5, 60 leaves, 3 steps):

$$-\frac{e^{-b^2 x^2} \,\text{Erfi}[b x]}{x} - \frac{2 b^3 x^2 \,\text{HypergeometricPFQ}\left[\{1, 1\}, \left\{\frac{3}{2}, 2\right\}, -b^2 x^2\right]}{\sqrt{\pi}} + \frac{2 b \,\text{Log}[x]}{\sqrt{\pi}}$$

Result (type 9, 26 leaves):

$$-\frac{1}{2} b \,\text{MeijerG}\left[\{\{0\}, \{1\}\}, \left\{\{0, 0\}, \left\{-\frac{1}{2}\right\}\right\}, b^2 x^2\right]$$

Problem 281: Unable to integrate problem.

$$\int \frac{e^{-b^2 x^2} \,\text{Erfi}[b x]}{x^4} \, dx$$

Optimal (type 5, 105 leaves, 5 steps):

$$-\frac{b}{3 \sqrt{\pi} x^2} - \frac{e^{-b^2 x^2} \,\text{Erfi}[b x]}{3 x^3} + \frac{2 b^2 e^{-b^2 x^2} \,\text{Erfi}[b x]}{3 x} + \frac{4 b^5 x^2 \,\text{HypergeometricPFQ}\left[\{1, 1\}, \left\{\frac{3}{2}, 2\right\}, -b^2 x^2\right]}{3 \sqrt{\pi}} - \frac{4 b^3 \,\text{Log}[x]}{3 \sqrt{\pi}}$$

Result (type 9, 29 leaves):

$$-\frac{b \,\text{MeijerG}\left[\{\{0\}, \{2\}\}, \left\{\{0, 1\}, \left\{-\frac{1}{2}\right\}\right\}, b^2 x^2\right]}{2 x^2}$$

Problem 282: Unable to integrate problem.

$$\int \frac{e^{-b^2 x^2} \,\text{Erfi}[b x]}{x^6} \, dx$$

Optimal (type 5, 144 leaves, 7 steps):

$$-\frac{b}{10\sqrt{\pi}\,x^4}+\frac{2\,b^3}{15\sqrt{\pi}\,x^2}-\frac{e^{-b^2x^2}\,\text{Erfi}[b\,x]}{5\,x^5}+\frac{2\,b^2\,e^{-b^2x^2}\,\text{Erfi}[b\,x]}{15\,x^3}-\frac{4\,b^4\,e^{-b^2x^2}\,\text{Erfi}[b\,x]}{15\,x}-\frac{8\,b^7\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-b^2x^2\right]}{15\sqrt{\pi}}+\frac{8\,b^5\,\text{Log}[x]}{15\sqrt{\pi}}$$

Result (type 9, 29 leaves) :

$$-\frac{b\,\text{MeijerG}\left[\{\{0\},\{3\}\},\left\{\{0,2\},\left\{-\frac{1}{2}\right\}\right\},b^2x^2\right]}{2\,x^4}$$

Problem 304: Unable to integrate problem.

$$\int \text{Erfi}[b\,x]\,\text{Sin}\left[c+i\,b^2x^2\right]\,dx$$

Optimal (type 5, 67 leaves, 4 steps) :

$$\frac{i\,e^{-i\,c}\sqrt{\pi}\,\text{Erfi}[b\,x]^2}{8\,b}-\frac{i\,b\,e^{i\,c}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-b^2x^2\right]}{2\sqrt{\pi}}$$

Result (type 8, 20 leaves) :

$$\int \text{Erfi}[b\,x]\,\text{Sin}\left[c+i\,b^2x^2\right]\,dx$$

Problem 305: Unable to integrate problem.

$$\int \text{Erfi}[b\,x]\,\text{Sin}\left[c-i\,b^2x^2\right]\,dx$$

Optimal (type 5, 67 leaves, 4 steps) :

$$-\frac{i\,e^{i\,c}\sqrt{\pi}\,\text{Erfi}[b\,x]^2}{8\,b}+\frac{i\,b\,e^{-i\,c}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-b^2x^2\right]}{2\sqrt{\pi}}$$

Result (type 8, 20 leaves) :

$$\int \text{Erfi}[b\,x]\,\text{Sin}\left[c-i\,b^2x^2\right]\,dx$$

Problem 306: Unable to integrate problem.

$$\int \text{Cos}\left[c + i\, b^2 x^2\right] \text{Erfi}[b\, x]\, dx$$

Optimal (type 5, 63 leaves, 4 steps):

$$\frac{e^{-i c} \sqrt{\pi}\, \text{Erfi}[b\, x]^2}{8\, b} + \frac{b\, e^{i c}\, x^2\, \text{HypergeometricPFQ}\left[\{1, 1\}, \left\{\frac{3}{2}, 2\right\}, -b^2 x^2\right]}{2 \sqrt{\pi}}$$

Result (type 8, 20 leaves):

$$\int \text{Cos}\left[c + i\, b^2 x^2\right] \text{Erfi}[b\, x]\, dx$$

Problem 307: Unable to integrate problem.

$$\int \text{Cos}\left[c - i\, b^2 x^2\right] \text{Erfi}[b\, x]\, dx$$

Optimal (type 5, 63 leaves, 4 steps):

$$\frac{e^{i c} \sqrt{\pi}\, \text{Erfi}[b\, x]^2}{8\, b} + \frac{b\, e^{-i c}\, x^2\, \text{HypergeometricPFQ}\left[\{1, 1\}, \left\{\frac{3}{2}, 2\right\}, -b^2 x^2\right]}{2 \sqrt{\pi}}$$

Result (type 8, 20 leaves):

$$\int \text{Cos}\left[c - i\, b^2 x^2\right] \text{Erfi}[b\, x]\, dx$$

Test results for the 218 problems in "8.2 Fresnel integral functions.m"

Problem 9: Unable to integrate problem.

$$\int \frac{\text{FresnelS}[b\, x]}{x}\, dx$$

Optimal (type 5, 73 leaves, 3 steps):

$$\frac{1}{2}\, i\, b\, x\, \text{HypergeometricPFQ}\left[\left\{\frac{1}{2}, \frac{1}{2}\right\}, \left\{\frac{3}{2}, \frac{3}{2}\right\}, -\frac{1}{2}\, i\, b^2 \pi x^2\right] - \frac{1}{2}\, i\, b\, x\, \text{HypergeometricPFQ}\left[\left\{\frac{1}{2}, \frac{1}{2}\right\}, \left\{\frac{3}{2}, \frac{3}{2}\right\}, \frac{1}{2}\, i\, b^2 \pi x^2\right]$$

Result (type 8, 10 leaves):

$$\int \frac{\text{FresnelS}[b\,x]}{x}\,dx$$

Problem 22: Result more than twice size of optimal antiderivative.

$$\int \text{FresnelS}[a+b\,x]\,dx$$

Optimal (type 4, 36 leaves, 1 step):

$$\frac{\text{Cos}\left[\frac{1}{2}\pi\,(a+b\,x)^2\right]}{b\,\pi}+\frac{(a+b\,x)\,\text{FresnelS}[a+b\,x]}{b}$$

Result (type 4, 89 leaves):

$$\frac{\text{Cos}\left[\frac{a^2\pi}{2}\right]\text{Cos}\left[a\,b\,\pi\,x+\frac{1}{2}b^2\,\pi\,x^2\right]}{b\,\pi}+\frac{a\,\text{FresnelS}[a+b\,x]}{b}+x\,\text{FresnelS}[a+b\,x]-\frac{\text{Sin}\left[\frac{a^2\pi}{2}\right]\text{Sin}\left[a\,b\,\pi\,x+\frac{1}{2}b^2\,\pi\,x^2\right]}{b\,\pi}$$

Problem 28: Result more than twice size of optimal antiderivative.

$$\int \text{FresnelS}[a+b\,x]\,dx$$

Optimal (type 4, 36 leaves, 1 step):

$$\frac{\text{Cos}\left[\frac{1}{2}\pi\,(a+b\,x)^2\right]}{b\,\pi}+\frac{(a+b\,x)\,\text{FresnelS}[a+b\,x]}{b}$$

Result (type 4, 89 leaves):

$$\frac{\text{Cos}\left[\frac{a^2\pi}{2}\right]\text{Cos}\left[a\,b\,\pi\,x+\frac{1}{2}b^2\,\pi\,x^2\right]}{b\,\pi}+\frac{a\,\text{FresnelS}[a+b\,x]}{b}+x\,\text{FresnelS}[a+b\,x]-\frac{\text{Sin}\left[\frac{a^2\pi}{2}\right]\text{Sin}\left[a\,b\,\pi\,x+\frac{1}{2}b^2\,\pi\,x^2\right]}{b\,\pi}$$

Problem 31: Unable to integrate problem.

$$\int x^7\,\text{FresnelS}[b\,x]^2\,dx$$

Optimal (type 4, 253 leaves, 23 steps):

$$-\frac{105\,x^2}{16\,b^6\,\pi^4}+\frac{7\,x^6}{48\,b^2\,\pi^2}-\frac{55\,x^2\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{16\,b^6\,\pi^4}+\frac{x^6\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{16\,b^2\,\pi^2}-\frac{35\,x^3\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{4\,b^5\,\pi^3}+\frac{x^7\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{4\,b\,\pi}-\frac{105\,\text{FresnelS}[b\,x]^2}{8\,b^8\,\pi^4}+\frac{1}{8}\,x^8\,\text{FresnelS}[b\,x]^2+\frac{105\,x\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{4\,b^7\,\pi^4}-\frac{7\,x^5\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}+\frac{10\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{b^8\,\pi^5}-\frac{5\,x^4\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{8\,b^4\,\pi^3}$$

Result (type 8, 12 leaves):

$$\int x^7\,\text{FresnelS}[b\,x]^2\,dx$$

Problem 33: Unable to integrate problem.

$$\int x^5\,\text{FresnelS}[b\,x]^2\,dx$$

Optimal (type 5, 265 leaves, 16 steps):

$$\frac{5\,x^4}{24\,b^2\,\pi^2}-\frac{11\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{6\,b^6\,\pi^4}+\frac{x^4\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{12\,b^2\,\pi^2}-\frac{5\,x\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^5\,\pi^3}+\frac{x^5\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{3\,b\,\pi}+\frac{5\,\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b^6\,\pi^3}+\frac{1}{6}\,x^6\,\text{FresnelS}[b\,x]^2-\frac{5\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^4\,\pi^3}+\frac{5\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^4\,\pi^3}-\frac{5\,x^3\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{3\,b^3\,\pi^2}-\frac{7\,x^2\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{12\,b^4\,\pi^3}$$

Result (type 8, 12 leaves):

$$\int x^5\,\text{FresnelS}[b\,x]^2\,dx$$

Problem 35: Unable to integrate problem.

$$\int x^3\,\text{FresnelS}[b\,x]^2\,dx$$

Optimal (type 4, 140 leaves, 10 steps):

$$\frac{3 x^2}{8 b^2 \pi^2}+\frac{x^2 \operatorname{Cos}\left[b^2 \pi x^2\right]}{8 b^2 \pi^2}+\frac{x^3 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelS}[b x]}{2 b \pi}+$$
$$\frac{3 \operatorname{FresnelS}[b x]^2}{4 b^4 \pi^2}+\frac{1}{4} x^4 \operatorname{FresnelS}[b x]^2-\frac{3 x \operatorname{FresnelS}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{2 b^3 \pi^2}-\frac{\operatorname{Sin}\left[b^2 \pi x^2\right]}{2 b^4 \pi^3}$$

Result (type 8, 12 leaves):

$$\int x^3 \operatorname{FresnelS}[b x]^2 \, dx$$

Problem 37: Unable to integrate problem.

$$\int x \operatorname{FresnelS}[b x]^2 \, dx$$

Optimal (type 5, 143 leaves, 5 steps):

$$\frac{\operatorname{Cos}\left[b^2 \pi x^2\right]}{4 b^2 \pi^2}+\frac{x \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelS}[b x]}{b \pi}-\frac{\operatorname{FresnelC}[b x] \operatorname{FresnelS}[b x]}{2 b^2 \pi}+\frac{1}{2} x^2 \operatorname{FresnelS}[b x]^2+$$
$$\frac{i x^2 \operatorname{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]}{8 \pi}-\frac{i x^2 \operatorname{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]}{8 \pi}$$

Result (type 8, 10 leaves):

$$\int x \operatorname{FresnelS}[b x]^2 \, dx$$

Problem 43: Unable to integrate problem.

$$\int \frac{\operatorname{FresnelS}[b x]^2}{x^5} \, dx$$

Optimal (type 4, 127 leaves, 9 steps):

$$-\frac{b^2}{24 x^2}+\frac{b^2 \operatorname{Cos}\left[b^2 \pi x^2\right]}{24 x^2}-\frac{b^3 \pi \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelS}[b x]}{6 x}-$$
$$\frac{1}{12} b^4 \pi^2 \operatorname{FresnelS}[b x]^2-\frac{\operatorname{FresnelS}[b x]^2}{4 x^4}-\frac{b \operatorname{FresnelS}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{6 x^3}+\frac{1}{12} b^4 \pi \operatorname{SinIntegral}\left[b^2 \pi x^2\right]$$

Result (type 8, 12 leaves):

$$\int \frac{\operatorname{FresnelS}[b x]^2}{x^5} \, dx$$

Problem 47: Unable to integrate problem.

$$\int \frac{\text{FresnelS}[b x]^2}{x^9} \, dx$$

Optimal (type 4, 242 leaves, 20 steps):

$$-\frac{b^2}{336 x^6}+\frac{b^6 \pi^2}{1680 x^2}+\frac{b^2 \text{Cos}\left[b^2 \pi x^2\right]}{336 x^6}-\frac{b^6 \pi^2 \text{Cos}\left[b^2 \pi x^2\right]}{336 x^2}-\frac{b^3 \pi \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{140 x^5}+\frac{b^7 \pi^3 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{420 x}+\frac{1}{840} b^8 \pi^4 \text{FresnelS}[b x]^2-\frac{\text{FresnelS}[b x]^2}{8 x^8}-\frac{b \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{28 x^7}+\frac{b^5 \pi^2 \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{420 x^3}-\frac{b^4 \pi \text{Sin}\left[b^2 \pi x^2\right]}{420 x^4}-\frac{1}{280} b^8 \pi^3 \text{SinIntegral}\left[b^2 \pi x^2\right]$$

Result (type 8, 12 leaves):

$$\int \frac{\text{FresnelS}[b x]^2}{x^9} \, dx$$

Problem 49: Unable to integrate problem.

$$\int (c+d x)^2 \text{FresnelS}[a+b x]^2 \, dx$$

Optimal (type 5, 497 leaves, 18 steps):

$$\frac{2 d^2 x}{3 b^2 \pi^2}+\frac{d (b c-a d) \text{Cos}\left[\pi (a+b x)^2\right]}{2 b^3 \pi^2}+\frac{d^2 (a+b x) \text{Cos}\left[\pi (a+b x)^2\right]}{6 b^3 \pi^2}-\frac{5 d^2 \text{FresnelC}\left[\sqrt{2} (a+b x)\right]}{6 \sqrt{2} b^3 \pi^2}+\frac{2 (b c-a d)^2 \text{Cos}\left[\frac{1}{2} \pi (a+b x)^2\right] \text{FresnelS}[a+b x]}{b^3 \pi}+\frac{2 d (b c-a d) (a+b x) \text{Cos}\left[\frac{1}{2} \pi (a+b x)^2\right] \text{FresnelS}[a+b x]}{b^3 \pi}+\frac{2 d^2 (a+b x)^2 \text{Cos}\left[\frac{1}{2} \pi (a+b x)^2\right] \text{FresnelS}[a+b x]}{3 b^3 \pi}-\frac{d (b c-a d) \text{FresnelC}[a+b x] \text{FresnelS}[a+b x]}{b^3 \pi}+\frac{(b c-a d)^2 (a+b x) \text{FresnelS}[a+b x]^2}{b^3}+\frac{d (b c-a d) (a+b x)^2 \text{FresnelS}[a+b x]^2}{b^3}+\frac{d^2 (a+b x)^3 \text{FresnelS}[a+b x]^2}{3 b^3}-\frac{(b c-a d)^2 \text{FresnelS}\left[\sqrt{2} (a+b x)\right]}{\sqrt{2} b^3 \pi}+\frac{i d (b c-a d) (a+b x)^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i \pi (a+b x)^2\right]}{4 b^3 \pi}-\frac{i d (b c-a d) (a+b x)^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i \pi (a+b x)^2\right]}{4 b^3 \pi}-\frac{4 d^2 \text{FresnelS}[a+b x] \text{Sin}\left[\frac{1}{2} \pi (a+b x)^2\right]}{3 b^3 \pi^2}$$

Result (type 8, 18 leaves):

$$\int (c+d\,x)^2\,\text{FresnelS}[a+b\,x]^2\,dx$$

Problem 50: Unable to integrate problem.

$$\int (c+d\,x)\,\text{FresnelS}[a+b\,x]^2\,dx$$

Optimal (type 5, 279 leaves, 10 steps):

$$\frac{d\,\text{Cos}\left[\pi\,(a+b\,x)^2\right]}{4\,b^2\,\pi^2}+\frac{2\,(b\,c-a\,d)\,\text{Cos}\left[\frac{1}{2}\pi\,(a+b\,x)^2\right]\,\text{FresnelS}[a+b\,x]}{b^2\,\pi}+\frac{d\,(a+b\,x)\,\text{Cos}\left[\frac{1}{2}\pi\,(a+b\,x)^2\right]\,\text{FresnelS}[a+b\,x]}{b^2\,\pi}-\frac{d\,\text{FresnelC}[a+b\,x]\,\text{FresnelS}[a+b\,x]}{2\,b^2\,\pi}+\frac{(b\,c-a\,d)\,(a+b\,x)\,\text{FresnelS}[a+b\,x]^2}{b^2}+\frac{d\,(a+b\,x)^2\,\text{FresnelS}[a+b\,x]^2}{2\,b^2}-\frac{(b\,c-a\,d)\,\text{FresnelS}\left[\sqrt{2}\,(a+b\,x)\right]}{\sqrt{2}\,b^2\,\pi}+\frac{i\,d\,(a+b\,x)^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}i\,\pi\,(a+b\,x)^2\right]}{8\,b^2\,\pi}-\frac{i\,d\,(a+b\,x)^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}i\,\pi\,(a+b\,x)^2\right]}{8\,b^2\,\pi}$$

Result (type 8, 16 leaves):

$$\int (c+d\,x)\,\text{FresnelS}[a+b\,x]^2\,dx$$

Problem 57: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{FresnelS}[d\,(a+b\,\text{Log}[c\,x^n])]}{x}\,dx$$

Optimal (type 4, 65 leaves, 3 steps):

$$\frac{\text{Cos}\left[\frac{1}{2}d^2\,\pi\,(a+b\,\text{Log}[c\,x^n])^2\right]}{b\,d\,n\,\pi}+\frac{\text{FresnelS}[d\,(a+b\,\text{Log}[c\,x^n])]\,(a+b\,\text{Log}[c\,x^n])}{b\,n}$$

Result (type 4, 164 leaves):

$$\frac{\text{Cos}\left[\frac{1}{2}a^2\,d^2\,\pi\right]\,\text{Cos}\left[a\,b\,d^2\,\pi\,\text{Log}[c\,x^n]+\frac{1}{2}b^2\,d^2\,\pi\,\text{Log}[c\,x^n]^2\right]}{b\,d\,n\,\pi}+\frac{a\,\text{FresnelS}[d\,(a+b\,\text{Log}[c\,x^n])]}{b\,n}+\frac{\text{FresnelS}[d\,(a+b\,\text{Log}[c\,x^n])]\,\text{Log}[c\,x^n]}{n}-\frac{\text{Sin}\left[\frac{1}{2}a^2\,d^2\,\pi\right]\,\text{Sin}\left[a\,b\,d^2\,\pi\,\text{Log}[c\,x^n]+\frac{1}{2}b^2\,d^2\,\pi\,\text{Log}[c\,x^n]^2\right]}{b\,d\,n\,\pi}$$

Problem 61: Unable to integrate problem.

$$\int e^{c+\frac{1}{2} i b^2 \pi x^2} \text{FresnelS}[b x] \, dx$$

Optimal (type 5, 64 leaves, 4 steps):

$$-\frac{e^c \text{Erfi}\left[\left(\frac{1}{2}+\frac{i}{2}\right) b \sqrt{\pi } x\right]^2}{8 b}+\frac{1}{4} i b e^c x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]$$

Result (type 8, 24 leaves):

$$\int e^{c+\frac{1}{2} i b^2 \pi x^2} \text{FresnelS}[b x] \, dx$$

Problem 62: Unable to integrate problem.

$$\int e^{c-\frac{1}{2} i b^2 \pi x^2} \text{FresnelS}[b x] \, dx$$

Optimal (type 5, 64 leaves, 4 steps):

$$\frac{e^c \text{Erf}\left[\left(\frac{1}{2}+\frac{i}{2}\right) b \sqrt{\pi } x\right]^2}{8 b}-\frac{1}{4} i b e^c x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]$$

Result (type 8, 24 leaves):

$$\int e^{c-\frac{1}{2} i b^2 \pi x^2} \text{FresnelS}[b x] \, dx$$

Problem 63: Unable to integrate problem.

$$\int \text{FresnelS}[b x] \text{Sin}\left[c+\frac{1}{2} b^2 \pi x^2\right] \, dx$$

Optimal (type 5, 101 leaves, 4 steps):

$$\frac{\text{Cos}[c] \text{FresnelS}[b x]^2}{2 b}+\frac{\text{FresnelC}[b x] \text{FresnelS}[b x] \text{Sin}[c]}{2 b}-$$
$$\frac{1}{8} i b x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right] \text{Sin}[c]+\frac{1}{8} i b x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right] \text{Sin}[c]$$

Result (type 8, 21 leaves):

$$\int \text{FresnelS}[b x] \text{Sin}\left[c+\frac{1}{2} b^2 \pi x^2\right] \, dx$$

Problem 64: Unable to integrate problem.

$$\int \text{Cos}\left[c+\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x] \, dx$$

Optimal (type 5, 101 leaves, 4 steps):

$$\frac{\text{Cos}[c] \text{FresnelC}[b x] \text{FresnelS}[b x]}{2 b}-\frac{1}{8} i b x^2 \text{Cos}[c] \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]+\frac{1}{8} i b x^2 \text{Cos}[c] \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]-\frac{\text{FresnelS}[b x]^2 \text{Sin}[c]}{2 b}$$

Result (type 8, 21 leaves):

$$\int \text{Cos}\left[c+\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x] \, dx$$

Problem 71: Unable to integrate problem.

$$\int x^8 \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Optimal (type 4, 232 leaves, 22 steps):

$$\frac{105 x^2}{4 b^7 \pi^4}-\frac{7 x^6}{12 b^3 \pi^2}+\frac{55 x^2 \text{Cos}\left[b^2 \pi x^2\right]}{4 b^7 \pi^4}-\frac{x^6 \text{Cos}\left[b^2 \pi x^2\right]}{4 b^3 \pi^2}+\frac{35 x^3 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{b^6 \pi^3}-\frac{x^7 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{b^2 \pi}+\frac{105 \text{FresnelS}[b x]^2}{2 b^9 \pi^4}-\frac{105 x \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b^8 \pi^4}+\frac{7 x^5 \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b^4 \pi^2}-\frac{40 \text{Sin}\left[b^2 \pi x^2\right]}{b^9 \pi^5}+\frac{5 x^4 \text{Sin}\left[b^2 \pi x^2\right]}{2 b^5 \pi^3}$$

Result (type 8, 22 leaves):

$$\int x^8 \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Problem 73: Unable to integrate problem.

$$\int x^6 \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Optimal (type 5, 248 leaves, 15 steps):

$$-\frac{5\,x^4}{8\,b^3\,\pi^2}+\frac{11\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{2\,b^7\,\pi^4}-\frac{x^4\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}+\frac{15\,x\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^6\,\pi^3}-\frac{x^5\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^2\,\pi}-$$

$$\frac{15\,\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b^7\,\pi^3}+\frac{15\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^5\,\pi^3}-$$

$$\frac{15\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^5\,\pi^3}+\frac{5\,x^3\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^4\,\pi^2}+\frac{7\,x^2\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^5\,\pi^3}$$

Result (type 8, 22 leaves):

$$\int x^6\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Problem 75: Unable to integrate problem.

$$\int x^4\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Optimal (type 4, 120 leaves, 9 steps):

$$-\frac{3\,x^2}{4\,b^3\,\pi^2}-\frac{x^2\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}-\frac{x^3\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^2\,\pi}-\frac{3\,\text{FresnelS}[b\,x]^2}{2\,b^5\,\pi^2}+\frac{3\,x\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^4\,\pi^2}+\frac{\text{Sin}\left[b^2\,\pi\,x^2\right]}{b^5\,\pi^3}$$

Result (type 8, 22 leaves):

$$\int x^4\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Problem 77: Unable to integrate problem.

$$\int x^2\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Optimal (type 5, 137 leaves, 4 steps):

$$-\frac{\text{Cos}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}-\frac{x\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^2\,\pi}+\frac{\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b^3\,\pi}-$$

$$\frac{i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b\,\pi}+\frac{i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b\,\pi}$$

Result (type 8, 22 leaves):

$$\int x^2\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Problem 83: Unable to integrate problem.

$$\int \frac{\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{x^4}\,dx$$

Optimal (type 4, 109 leaves, 8 steps):

$$-\frac{b}{12\,x^2}+\frac{b\,\text{Cos}\left[b^2\pi x^2\right]}{12\,x^2}-\frac{b^2\pi\,\text{Cos}\left[\frac{1}{2}b^2\pi x^2\right]\text{FresnelS}[b\,x]}{3\,x}-\frac{1}{6}b^3\pi^2\,\text{FresnelS}[b\,x]^2-\frac{\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{3\,x^3}+\frac{1}{6}b^3\pi\,\text{SinIntegral}\left[b^2\pi x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{x^4}\,dx$$

Problem 87: Unable to integrate problem.

$$\int \frac{\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{x^8}\,dx$$

Optimal (type 4, 224 leaves, 19 steps):

$$-\frac{b}{84\,x^6}+\frac{b^5\pi^2}{420\,x^2}+\frac{b\,\text{Cos}\left[b^2\pi x^2\right]}{84\,x^6}-\frac{b^5\pi^2\,\text{Cos}\left[b^2\pi x^2\right]}{84\,x^2}-\frac{b^2\pi\,\text{Cos}\left[\frac{1}{2}b^2\pi x^2\right]\text{FresnelS}[b\,x]}{35\,x^5}+\frac{b^6\pi^3\,\text{Cos}\left[\frac{1}{2}b^2\pi x^2\right]\text{FresnelS}[b\,x]}{105\,x}+$$
$$\frac{1}{210}b^7\pi^4\,\text{FresnelS}[b\,x]^2-\frac{\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{7\,x^7}+\frac{b^4\pi^2\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{105\,x^3}-\frac{b^3\pi\,\text{Sin}\left[b^2\pi x^2\right]}{105\,x^4}-\frac{1}{70}b^7\pi^3\,\text{SinIntegral}\left[b^2\pi x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}b^2\pi x^2\right]}{x^8}\,dx$$

Problem 91: Unable to integrate problem.

$$\int x^8\,\text{Cos}\left[\frac{1}{2}b^2\pi x^2\right]\text{FresnelS}[b\,x]\,dx$$

Optimal (type 5, 307 leaves, 23 steps):

$$\frac{35\,x^4}{8\,b^5\,\pi^3}-\frac{x^8}{16\,b\,\pi}-\frac{40\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{b^9\,\pi^5}+\frac{5\,x^4\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{2\,b^5\,\pi^3}-$$
$$\frac{105\,x\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^8\,\pi^4}+\frac{7\,x^5\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^4\,\pi^2}+\frac{105\,\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b^9\,\pi^4}-$$
$$\frac{105\,\mathrm{i}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,\mathrm{i}\,b^2\,\pi\,x^2\right]}{8\,b^7\,\pi^4}+\frac{105\,\mathrm{i}\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,\mathrm{i}\,b^2\,\pi\,x^2\right]}{8\,b^7\,\pi^4}-$$
$$\frac{35\,x^3\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^6\,\pi^3}+\frac{x^7\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^2\,\pi}-\frac{55\,x^2\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^7\,\pi^4}+\frac{x^6\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}$$

Result (type 8, 22 leaves):

$$\int x^8\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Problem 93: Unable to integrate problem.

$$\int x^6\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Optimal (type 4, 184 leaves, 16 steps):

$$\frac{15\,x^2}{4\,b^5\,\pi^3}-\frac{x^6}{12\,b\,\pi}+\frac{7\,x^2\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{4\,b^5\,\pi^3}+\frac{5\,x^3\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^4\,\pi^2}+\frac{15\,\text{FresnelS}[b\,x]^2}{2\,b^7\,\pi^3}-$$
$$\frac{15\,x\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^6\,\pi^3}+\frac{x^5\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^2\,\pi}-\frac{11\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{2\,b^7\,\pi^4}+\frac{x^4\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}$$

Result (type 8, 22 leaves):

$$\int x^6\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Problem 95: Unable to integrate problem.

$$\int x^4\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Optimal (type 5, 195 leaves, 10 steps):

$$-\frac{x^4}{8\,b\,\pi}+\frac{\text{Cos}\left[b^2\,\pi\,x^2\right]}{b^5\,\pi^3}+\frac{3\,x\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]}{b^4\,\pi^2}-\frac{3\,\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b^5\,\pi^2}+\frac{3\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^3\,\pi^2}-\frac{3\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^3\,\pi^2}+\frac{x^3\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^2\,\pi}+\frac{x^2\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}$$

Result (type 8, 22 leaves):

$$\int x^4\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Problem 97: Unable to integrate problem.

$$\int x^2\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Optimal (type 4, 73 leaves, 5 steps):

$$-\frac{x^2}{4\,b\,\pi}-\frac{\text{FresnelS}[b\,x]^2}{2\,b^3\,\pi}+\frac{x\,\text{FresnelS}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^2\,\pi}+\frac{\text{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}$$

Result (type 8, 22 leaves):

$$\int x^2\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Problem 99: Unable to integrate problem.

$$\int \text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Optimal (type 5, 80 leaves, 1 step):

$$\frac{\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b}-\frac{1}{8}\,i\,b\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]+\frac{1}{8}\,i\,b\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]$$

Result (type 8, 19 leaves):

$$\int \text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelS}[b\,x]\,dx$$

Problem 101: Unable to integrate problem.

$$\int \frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{x^2} \, dx$$

Optimal (type 4, 48 leaves, 4 steps):

$$-\frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{x} - \frac{1}{2} b \pi \text{FresnelS}[b x]^2 + \frac{1}{4} b \, \text{SinIntegral}\left[b^2 \pi x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{x^2} \, dx$$

Problem 105: Unable to integrate problem.

$$\int \frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{x^6} \, dx$$

Optimal (type 4, 163 leaves, 13 steps):

$$\frac{b^3 \pi}{60 x^2} - \frac{b^3 \pi \text{Cos}\left[b^2 \pi x^2\right]}{24 x^2} - \frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{5 x^5} + \frac{b^4 \pi^2 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{15 x} + \frac{1}{30} b^5 \pi^3 \text{FresnelS}[b x]^2 + \frac{b^2 \pi \text{FresnelS}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{15 x^3} - \frac{b \, \text{Sin}\left[b^2 \pi x^2\right]}{40 x^4} - \frac{7}{120} b^5 \pi^2 \text{SinIntegral}\left[b^2 \pi x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{x^6} \, dx$$

Problem 109: Unable to integrate problem.

$$\int \frac{\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelS}[b x]}{x^{10}} \, dx$$

Optimal (type 4, 278 leaves, 26 steps):

$$\frac{b^3\pi}{756x^6}-\frac{b^7\pi^3}{3780x^2}-\frac{11b^3\pi\,\text{Cos}[b^2\pi x^2]}{3024x^6}+\frac{5b^7\pi^3\,\text{Cos}[b^2\pi x^2]}{2016x^2}-\frac{\text{Cos}[\frac{1}{2}b^2\pi x^2]\,\text{FresnelS}[b x]}{9x^9}+$$
$$\frac{b^4\pi^2\,\text{Cos}[\frac{1}{2}b^2\pi x^2]\,\text{FresnelS}[b x]}{315x^5}-\frac{b^8\pi^4\,\text{Cos}[\frac{1}{2}b^2\pi x^2]\,\text{FresnelS}[b x]}{945x}-\frac{b^9\pi^5\,\text{FresnelS}[b x]^2}{1890}+\frac{b^2\pi\,\text{FresnelS}[b x]\,\text{Sin}[\frac{1}{2}b^2\pi x^2]}{63x^7}-$$
$$\frac{b^6\pi^3\,\text{FresnelS}[b x]\,\text{Sin}[\frac{1}{2}b^2\pi x^2]}{945x^3}-\frac{b\,\text{Sin}[b^2\pi x^2]}{144x^8}+\frac{67b^5\pi^2\,\text{Sin}[b^2\pi x^2]}{30240x^4}+\frac{83b^9\pi^4\,\text{SinIntegral}[b^2\pi x^2]}{30240}$$

Result (type 8, 22 leaves):

$$\int\frac{\text{Cos}[\frac{1}{2}b^2\pi x^2]\,\text{FresnelS}[b x]}{x^{10}}\,dx$$

Problem 118: Unable to integrate problem.

$$\int\frac{\text{FresnelC}[b x]}{x}\,dx$$

Optimal (type 5, 69 leaves, 3 steps):

$$\frac{1}{2}b x\,\text{HypergeometricPFQ}[\{\frac{1}{2},\frac{1}{2}\},\{\frac{3}{2},\frac{3}{2}\},-\frac{1}{2}i b^2\pi x^2]+\frac{1}{2}b x\,\text{HypergeometricPFQ}[\{\frac{1}{2},\frac{1}{2}\},\{\frac{3}{2},\frac{3}{2}\},\frac{1}{2}i b^2\pi x^2]$$

Result (type 8, 10 leaves):

$$\int\frac{\text{FresnelC}[b x]}{x}\,dx$$

Problem 131: Result more than twice size of optimal antiderivative.

$$\int\text{FresnelC}[a+b x]\,dx$$

Optimal (type 4, 37 leaves, 1 step):

$$\frac{(a+b x)\,\text{FresnelC}[a+b x]}{b}-\frac{\text{Sin}[\frac{1}{2}\pi(a+b x)^2]}{b\pi}$$

Result (type 4, 90 leaves):

$$\frac{a\,\text{FresnelC}[a+b x]}{b}+x\,\text{FresnelC}[a+b x]-\frac{\text{Cos}[a b\pi x+\frac{1}{2}b^2\pi x^2]\,\text{Sin}[\frac{a^2\pi}{2}]}{b\pi}-\frac{\text{Cos}[\frac{a^2\pi}{2}]\,\text{Sin}[a b\pi x+\frac{1}{2}b^2\pi x^2]}{b\pi}$$

Problem 137: Result more than twice size of optimal antiderivative.

$$\int \text{FresnelC}[a+b x]\, dx$$

Optimal (type 4, 37 leaves, 1 step):

$$\frac{(a+b x)\,\text{FresnelC}[a+b x]}{b}-\frac{\text{Sin}\left[\frac{1}{2}\pi (a+b x)^2\right]}{b \pi}$$

Result (type 4, 90 leaves):

$$\frac{a\,\text{FresnelC}[a+b x]}{b}+x\,\text{FresnelC}[a+b x]-\frac{\text{Cos}\left[a b \pi x+\frac{1}{2} b^2 \pi x^2\right]\text{Sin}\left[\frac{a^2 \pi}{2}\right]}{b \pi}-\frac{\text{Cos}\left[\frac{a^2 \pi}{2}\right]\text{Sin}\left[a b \pi x+\frac{1}{2} b^2 \pi x^2\right]}{b \pi}$$

Problem 140: Unable to integrate problem.

$$\int x^7\,\text{FresnelC}[b x]^2\, dx$$

Optimal (type 4, 253 leaves, 23 steps):

$$-\frac{105 x^2}{16 b^6 \pi^4}+\frac{7 x^6}{48 b^2 \pi^2}+\frac{55 x^2 \text{Cos}\left[b^2 \pi x^2\right]}{16 b^6 \pi^4}-\frac{x^6 \text{Cos}\left[b^2 \pi x^2\right]}{16 b^2 \pi^2}+\frac{105 x\,\text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right]\text{FresnelC}[b x]}{4 b^7 \pi^4}-$$
$$\frac{7 x^5 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right]\text{FresnelC}[b x]}{4 b^3 \pi^2}-\frac{105\,\text{FresnelC}[b x]^2}{8 b^8 \pi^4}+\frac{1}{8} x^8\,\text{FresnelC}[b x]^2+$$
$$\frac{35 x^3\,\text{FresnelC}[b x]\,\text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{4 b^5 \pi^3}-\frac{x^7\,\text{FresnelC}[b x]\,\text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{4 b \pi}-\frac{10\,\text{Sin}\left[b^2 \pi x^2\right]}{b^8 \pi^5}+\frac{5 x^4\,\text{Sin}\left[b^2 \pi x^2\right]}{8 b^4 \pi^3}$$

Result (type 8, 12 leaves):

$$\int x^7\,\text{FresnelC}[b x]^2\, dx$$

Problem 142: Unable to integrate problem.

$$\int x^5\,\text{FresnelC}[b x]^2\, dx$$

Optimal (type 5, 265 leaves, 16 steps):

$$\frac{5 x^4}{24 b^2 \pi^2}+\frac{11 \text{Cos}\left[b^2 \pi x^2\right]}{6 b^6 \pi^4}-\frac{x^4 \text{Cos}\left[b^2 \pi x^2\right]}{12 b^2 \pi^2}-\frac{5 x^3 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelC}[b x]}{3 b^3 \pi^2}+$$
$$\frac{1}{6} x^6 \text{FresnelC}[b x]^2-\frac{5 \text{FresnelC}[b x] \text{FresnelS}[b x]}{2 b^6 \pi^3}-\frac{5 i x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]}{8 b^4 \pi^3}+$$
$$\frac{5 i x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]}{8 b^4 \pi^3}+\frac{5 x \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b^5 \pi^3}-\frac{x^5 \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{3 b \pi}+\frac{7 x^2 \text{Sin}\left[b^2 \pi x^2\right]}{12 b^4 \pi^3}$$

Result (type 8, 12 leaves):

$$\int x^5 \text{FresnelC}[b x]^2 \, dx$$

Problem 144: Unable to integrate problem.

$$\int x^3 \text{FresnelC}[b x]^2 \, dx$$

Optimal (type 4, 140 leaves, 10 steps):

$$\frac{3 x^2}{8 b^2 \pi^2}-\frac{x^2 \text{Cos}\left[b^2 \pi x^2\right]}{8 b^2 \pi^2}-\frac{3 x \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelC}[b x]}{2 b^3 \pi^2}+$$
$$\frac{3 \text{FresnelC}[b x]^2}{4 b^4 \pi^2}+\frac{1}{4} x^4 \text{FresnelC}[b x]^2-\frac{x^3 \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{2 b \pi}+\frac{\text{Sin}\left[b^2 \pi x^2\right]}{2 b^4 \pi^3}$$

Result (type 8, 12 leaves):

$$\int x^3 \text{FresnelC}[b x]^2 \, dx$$

Problem 146: Unable to integrate problem.

$$\int x \text{FresnelC}[b x]^2 \, dx$$

Optimal (type 5, 144 leaves, 5 steps):

$$-\frac{\text{Cos}\left[b^2 \pi x^2\right]}{4 b^2 \pi^2}+\frac{1}{2} x^2 \text{FresnelC}[b x]^2+\frac{\text{FresnelC}[b x] \text{FresnelS}[b x]}{2 b^2 \pi}+\frac{i x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]}{8 \pi}-$$
$$\frac{i x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]}{8 \pi}-\frac{x \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b \pi}$$

Result (type 8, 10 leaves):

$$\int x\,\text{FresnelC}[b\,x]^2\,dx$$

Problem 152: Unable to integrate problem.

$$\int \frac{\text{FresnelC}[b\,x]^2}{x^5}\,dx$$

Optimal (type 4, 127 leaves, 9 steps):

$$-\frac{b^2}{24\,x^2}-\frac{b^2\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{24\,x^2}-\frac{b\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{6\,x^3}-\frac{1}{12}\,b^4\,\pi^2\,\text{FresnelC}[b\,x]^2-\frac{\text{FresnelC}[b\,x]^2}{4\,x^4}+\frac{b^3\,\pi\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{6\,x}-\frac{1}{12}\,b^4\,\pi\,\text{SinIntegral}\left[b^2\,\pi\,x^2\right]$$

Result (type 8, 12 leaves):

$$\int \frac{\text{FresnelC}[b\,x]^2}{x^5}\,dx$$

Problem 156: Unable to integrate problem.

$$\int \frac{\text{FresnelC}[b\,x]^2}{x^9}\,dx$$

Optimal (type 4, 242 leaves, 20 steps):

$$-\frac{b^2}{336\,x^6}+\frac{b^6\,\pi^2}{1680\,x^2}-\frac{b^2\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{336\,x^6}+\frac{b^6\,\pi^2\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{336\,x^2}-\frac{b\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{28\,x^7}+\frac{b^5\,\pi^2\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{420\,x^3}+\frac{1}{840}\,b^8\,\pi^4\,\text{FresnelC}[b\,x]^2-\frac{\text{FresnelC}[b\,x]^2}{8\,x^8}+\frac{b^3\,\pi\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{140\,x^5}-\frac{b^7\,\pi^3\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{420\,x}+\frac{b^4\,\pi\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{420\,x^4}+\frac{1}{280}\,b^8\,\pi^3\,\text{SinIntegral}\left[b^2\,\pi\,x^2\right]$$

Result (type 8, 12 leaves):

$$\int \frac{\text{FresnelC}[b\,x]^2}{x^9}\,dx$$

Problem 158: Unable to integrate problem.

$$\int (c+d x)^2 \text{FresnelC}[a+b x]^2 \, dx$$

Optimal (type 5, 495 leaves, 18 steps):

$$\frac{2 d^2 x}{3 b^2 \pi^2}-\frac{d (b c-a d) \text{Cos}\left[\pi (a+b x)^2\right]}{2 b^3 \pi^2}-\frac{d^2 (a+b x) \text{Cos}\left[\pi (a+b x)^2\right]}{6 b^3 \pi^2}-\frac{4 d^2 \text{Cos}\left[\frac{1}{2} \pi (a+b x)^2\right] \text{FresnelC}[a+b x]}{3 b^3 \pi^2}+\frac{(b c-a d)^2 (a+b x) \text{FresnelC}[a+b x]^2}{b^3}+\frac{d (b c-a d) (a+b x)^2 \text{FresnelC}[a+b x]^2}{b^3}+\frac{d^2 (a+b x)^3 \text{FresnelC}[a+b x]^2}{3 b^3}+\frac{5 d^2 \text{FresnelC}\left[\sqrt{2} (a+b x)\right]}{6 \sqrt{2} b^3 \pi^2}+\frac{d (b c-a d) \text{FresnelC}[a+b x] \text{FresnelS}[a+b x]}{b^3 \pi}+\frac{(b c-a d)^2 \text{FresnelS}\left[\sqrt{2} (a+b x)\right]}{\sqrt{2} b^3 \pi}+\frac{i d (b c-a d) (a+b x)^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i \pi (a+b x)^2\right]}{4 b^3 \pi}-\frac{i d (b c-a d) (a+b x)^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i \pi (a+b x)^2\right]}{4 b^3 \pi}-\frac{2 (b c-a d)^2 \text{FresnelC}[a+b x] \text{Sin}\left[\frac{1}{2} \pi (a+b x)^2\right]}{b^3 \pi}-\frac{2 d (b c-a d) (a+b x) \text{FresnelC}[a+b x] \text{Sin}\left[\frac{1}{2} \pi (a+b x)^2\right]}{b^3 \pi}-\frac{2 d^2 (a+b x)^2 \text{FresnelC}[a+b x] \text{Sin}\left[\frac{1}{2} \pi (a+b x)^2\right]}{3 b^3 \pi}$$

Result (type 8, 18 leaves):

$$\int (c+d x)^2 \text{FresnelC}[a+b x]^2 \, dx$$

Problem 159: Unable to integrate problem.

$$\int (c+d x) \text{FresnelC}[a+b x]^2 \, dx$$

Optimal (type 5, 279 leaves, 10 steps):

$$-\frac{d\,\text{Cos}\left[\pi\,(a+b\,x)^2\right]}{4\,b^2\,\pi^2}+\frac{(b\,c-a\,d)\,(a+b\,x)\,\text{FresnelC}[a+b\,x]^2}{b^2}+\frac{d\,(a+b\,x)^2\,\text{FresnelC}[a+b\,x]^2}{2\,b^2}+\frac{d\,\text{FresnelC}[a+b\,x]\,\text{FresnelS}[a+b\,x]}{2\,b^2\,\pi}+\frac{(b\,c-a\,d)\,\text{FresnelS}\left[\sqrt{2}\,(a+b\,x)\right]}{\sqrt{2}\,b^2\,\pi}+\frac{i\,d\,(a+b\,x)^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,\pi\,(a+b\,x)^2\right]}{8\,b^2\,\pi}-\frac{i\,d\,(a+b\,x)^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,\pi\,(a+b\,x)^2\right]}{8\,b^2\,\pi}-\frac{2\,(b\,c-a\,d)\,\text{FresnelC}[a+b\,x]\,\text{Sin}\left[\frac{1}{2}\,\pi\,(a+b\,x)^2\right]}{b^2\,\pi}-\frac{d\,(a+b\,x)\,\text{FresnelC}[a+b\,x]\,\text{Sin}\left[\frac{1}{2}\,\pi\,(a+b\,x)^2\right]}{b^2\,\pi}$$

Result (type 8, 16 leaves):

$$\int (c+d\,x)\,\text{FresnelC}[a+b\,x]^2\,dx$$

Problem 166: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{FresnelC}\left[d\,(a+b\,\text{Log}[c\,x^n])\right]}{x}\,dx$$

Optimal (type 4, 66 leaves, 3 steps):

$$\frac{\text{FresnelC}\left[d\,(a+b\,\text{Log}[c\,x^n])\right]\,(a+b\,\text{Log}[c\,x^n])}{b\,n}-\frac{\text{Sin}\left[\frac{1}{2}\,d^2\,\pi\,(a+b\,\text{Log}[c\,x^n])^2\right]}{b\,d\,n\,\pi}$$

Result (type 4, 165 leaves):

$$\frac{a\,\text{FresnelC}\left[d\,(a+b\,\text{Log}[c\,x^n])\right]}{b\,n}+\frac{\text{FresnelC}\left[d\,(a+b\,\text{Log}[c\,x^n])\right]\,\text{Log}[c\,x^n]}{n}-\frac{\text{Cos}\left[a\,b\,d^2\,\pi\,\text{Log}[c\,x^n]+\frac{1}{2}\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]^2\right]\,\text{Sin}\left[\frac{1}{2}\,a^2\,d^2\,\pi\right]}{b\,d\,n\,\pi}-\frac{\text{Cos}\left[\frac{1}{2}\,a^2\,d^2\,\pi\right]\,\text{Sin}\left[a\,b\,d^2\,\pi\,\text{Log}[c\,x^n]+\frac{1}{2}\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]^2\right]}{b\,d\,n\,\pi}$$

Problem 170: Unable to integrate problem.

$$\int e^{c+\frac{1}{2}\,i\,b^2\,\pi\,x^2}\,\text{FresnelC}[b\,x]\,dx$$

Optimal (type 5, 64 leaves, 4 steps):

$$-\frac{i\,e^c\,\text{Erfi}\left[\left(\frac{1}{2}+\frac{i}{2}\right)\,b\,\sqrt{\pi}\,x\right]^2}{8\,b}+\frac{1}{4}\,b\,e^c\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]$$

Result (type 8, 24 leaves):

$$\int e^{c+\frac{1}{2} i b^2 \pi x^2} \text{FresnelC}[b x] \, dx$$

Problem 171: Unable to integrate problem.

$$\int e^{c-\frac{1}{2} i b^2 \pi x^2} \text{FresnelC}[b x] \, dx$$

Optimal (type 5, 64 leaves, 4 steps):

$$-\frac{i e^c \text{Erf}\left[\left(\frac{1}{2}+\frac{i}{2}\right) b \sqrt{\pi} x\right]^2}{8 b}+\frac{1}{4} b e^c x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]$$

Result (type 8, 24 leaves):

$$\int e^{c-\frac{1}{2} i b^2 \pi x^2} \text{FresnelC}[b x] \, dx$$

Problem 172: Unable to integrate problem.

$$\int \text{FresnelC}[b x] \text{Sin}\left[c+\frac{1}{2} b^2 \pi x^2\right] dx$$

Optimal (type 5, 101 leaves, 4 steps):

$$\frac{\text{Cos}[c] \text{FresnelC}[b x] \text{FresnelS}[b x]}{2 b}+\frac{1}{8} i b x^2 \text{Cos}[c] \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]-$$
$$\frac{1}{8} i b x^2 \text{Cos}[c] \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]+\frac{\text{FresnelC}[b x]^2 \text{Sin}[c]}{2 b}$$

Result (type 8, 21 leaves):

$$\int \text{FresnelC}[b x] \text{Sin}\left[c+\frac{1}{2} b^2 \pi x^2\right] dx$$

Problem 173: Unable to integrate problem.

$$\int \text{Cos}\left[c+\frac{1}{2} b^2 \pi x^2\right] \text{FresnelC}[b x] \, dx$$

Optimal (type 5, 101 leaves, 4 steps):

$$\frac{\text{Cos}[c]\,\text{FresnelC}[b\,x]^2}{2\,b}-\frac{\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]\,\text{Sin}[c]}{2\,b}-\frac{1}{8}\,i\,b\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]\,\text{Sin}[c]+\frac{1}{8}\,i\,b\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]\,\text{Sin}[c]$$

Result (type 8, 21 leaves):

$$\int \text{Cos}\left[c+\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]\,dx$$

Problem 180: Unable to integrate problem.

$$\int x^8\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]\,dx$$

Optimal (type 4, 231 leaves, 22 steps):

$$\frac{105\,x^2}{4\,b^7\,\pi^4}-\frac{7\,x^6}{12\,b^3\,\pi^2}-\frac{55\,x^2\,\text{Cos}[b^2\,\pi\,x^2]}{4\,b^7\,\pi^4}+\frac{x^6\,\text{Cos}[b^2\,\pi\,x^2]}{4\,b^3\,\pi^2}-\frac{105\,x\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{b^8\,\pi^4}+\frac{7\,x^5\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{b^4\,\pi^2}+\frac{105\,\text{FresnelC}[b\,x]^2}{2\,b^9\,\pi^4}-\frac{35\,x^3\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^6\,\pi^3}+\frac{x^7\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^2\,\pi}+\frac{40\,\text{Sin}[b^2\,\pi\,x^2]}{b^9\,\pi^5}-\frac{5\,x^4\,\text{Sin}[b^2\,\pi\,x^2]}{2\,b^5\,\pi^3}$$

Result (type 8, 22 leaves):

$$\int x^8\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]\,dx$$

Problem 182: Unable to integrate problem.

$$\int x^6\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]\,dx$$

Optimal (type 5, 247 leaves, 15 steps):

$$-\frac{5\,x^4}{8\,b^3\,\pi^2}-\frac{11\,\text{Cos}[b^2\,\pi\,x^2]}{2\,b^7\,\pi^4}+\frac{x^4\,\text{Cos}[b^2\,\pi\,x^2]}{4\,b^3\,\pi^2}+\frac{5\,x^3\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{b^4\,\pi^2}+\frac{15\,\text{FresnelC}[b\,x]\,\text{FresnelS}[b\,x]}{2\,b^7\,\pi^3}+\frac{15\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^5\,\pi^3}-\frac{15\,i\,x^2\,\text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^5\,\pi^3}-\frac{15\,x\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^6\,\pi^3}+\frac{x^5\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^2\,\pi}-\frac{7\,x^2\,\text{Sin}[b^2\,\pi\,x^2]}{4\,b^5\,\pi^3}$$

Result (type 8, 22 leaves):

$$\int x^6 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x] \, dx$$

Problem 184: Unable to integrate problem.

$$\int x^4 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x] \, dx$$

Optimal (type 4, 120 leaves, 9 steps):

$$-\frac{3 x^2}{4 b^3 \pi^2}+\frac{x^2 \operatorname{Cos}\left[b^2 \pi x^2\right]}{4 b^3 \pi^2}+\frac{3 x \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{b^4 \pi^2}-\frac{3 \operatorname{FresnelC}[b x]^2}{2 b^5 \pi^2}+\frac{x^3 \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b^2 \pi}-\frac{\operatorname{Sin}\left[b^2 \pi x^2\right]}{b^5 \pi^3}$$

Result (type 8, 22 leaves):

$$\int x^4 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x] \, dx$$

Problem 186: Unable to integrate problem.

$$\int x^2 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x] \, dx$$

Optimal (type 5, 136 leaves, 4 steps):

$$\frac{\operatorname{Cos}\left[b^2 \pi x^2\right]}{4 b^3 \pi^2}-\frac{\operatorname{FresnelC}[b x] \operatorname{FresnelS}[b x]}{2 b^3 \pi}-\frac{i x^2 \operatorname{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]}{8 b \pi}+\frac{i x^2 \operatorname{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]}{8 b \pi}+\frac{x \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b^2 \pi}$$

Result (type 8, 22 leaves):

$$\int x^2 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x] \, dx$$

Problem 192: Unable to integrate problem.

$$\int \frac{\operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{x^4} \, dx$$

Optimal (type 4, 109 leaves, 8 steps):

$$-\frac{b}{12 x^2}-\frac{b \operatorname{Cos}\left[b^2 \pi x^2\right]}{12 x^2}-\frac{\operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{3 x^3}-\frac{1}{6} b^3 \pi^2 \operatorname{FresnelC}[b x]^2+\frac{b^2 \pi \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{3 x}-\frac{1}{6} b^3 \pi \operatorname{SinIntegral}\left[b^2 \pi x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{x^4} \, dx$$

Problem 196: Unable to integrate problem.

$$\int \frac{\operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{x^8} \, dx$$

Optimal (type 4, 224 leaves, 19 steps):

$$-\frac{b}{84 x^6}+\frac{b^5 \pi^2}{420 x^2}-\frac{b \operatorname{Cos}\left[b^2 \pi x^2\right]}{84 x^6}+\frac{b^5 \pi^2 \operatorname{Cos}\left[b^2 \pi x^2\right]}{84 x^2}-\frac{\operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{7 x^7}+\frac{b^4 \pi^2 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{105 x^3}+\frac{1}{210} b^7 \pi^4 \operatorname{FresnelC}[b x]^2+$$
$$\frac{b^2 \pi \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{35 x^5}-\frac{b^6 \pi^3 \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{105 x}+\frac{b^3 \pi \operatorname{Sin}\left[b^2 \pi x^2\right]}{105 x^4}+\frac{1}{70} b^7 \pi^3 \operatorname{SinIntegral}\left[b^2 \pi x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{x^8} \, dx$$

Problem 200: Unable to integrate problem.

$$\int x^8 \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Optimal (type 5, 308 leaves, 23 steps):

$$-\frac{35\,x^4}{8\,b^5\,\pi^3}+\frac{x^8}{16\,b\,\pi}-\frac{40\,\mathrm{Cos}\left[b^2\,\pi\,x^2\right]}{b^9\,\pi^5}+\frac{5\,x^4\,\mathrm{Cos}\left[b^2\,\pi\,x^2\right]}{2\,b^5\,\pi^3}+\frac{35\,x^3\,\mathrm{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\mathrm{FresnelC}[b\,x]}{b^6\,\pi^3}-\frac{x^7\,\mathrm{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\mathrm{FresnelC}[b\,x]}{b^2\,\pi}+\frac{105\,\mathrm{FresnelC}[b\,x]\,\mathrm{FresnelS}[b\,x]}{2\,b^9\,\pi^4}+\frac{105\,i\,x^2\,\mathrm{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^7\,\pi^4}-\frac{105\,i\,x^2\,\mathrm{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2}\,i\,b^2\,\pi\,x^2\right]}{8\,b^7\,\pi^4}-\frac{105\,x\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^8\,\pi^4}+\frac{7\,x^5\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^4\,\pi^2}-\frac{55\,x^2\,\mathrm{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^7\,\pi^4}+\frac{x^6\,\mathrm{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}$$

Result (type 8, 22 leaves) :

$$\int x^8\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Problem 202: Unable to integrate problem.

$$\int x^6\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Optimal (type 4, 185 leaves, 16 steps) :

$$-\frac{15\,x^2}{4\,b^5\,\pi^3}+\frac{x^6}{12\,b\,\pi}+\frac{7\,x^2\,\mathrm{Cos}\left[b^2\,\pi\,x^2\right]}{4\,b^5\,\pi^3}+\frac{15\,x\,\mathrm{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\mathrm{FresnelC}[b\,x]}{b^6\,\pi^3}-\frac{x^5\,\mathrm{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\mathrm{FresnelC}[b\,x]}{b^2\,\pi}-\frac{15\,\mathrm{FresnelC}[b\,x]^2}{2\,b^7\,\pi^3}+\frac{5\,x^3\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{b^4\,\pi^2}-\frac{11\,\mathrm{Sin}\left[b^2\,\pi\,x^2\right]}{2\,b^7\,\pi^4}+\frac{x^4\,\mathrm{Sin}\left[b^2\,\pi\,x^2\right]}{4\,b^3\,\pi^2}$$

Result (type 8, 22 leaves) :

$$\int x^6\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Problem 204: Unable to integrate problem.

$$\int x^4\,\mathrm{FresnelC}[b\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,dx$$

Optimal (type 5, 196 leaves, 10 steps) :

$$\frac{x^4}{8 b \pi}+\frac{\text{Cos}\left[b^2 \pi x^2\right]}{b^5 \pi^3}-\frac{x^3 \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelC}[b x]}{b^2 \pi}-\frac{3 \text{FresnelC}[b x] \text{FresnelS}[b x]}{2 b^5 \pi^2}-\frac{3 i x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]}{8 b^3 \pi^2}+$$
$$\frac{3 i x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]}{8 b^3 \pi^2}+\frac{3 x \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{b^4 \pi^2}+\frac{x^2 \text{Sin}\left[b^2 \pi x^2\right]}{4 b^3 \pi^2}$$

Result (type 8, 22 leaves):

$$\int x^4 \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Problem 206: Unable to integrate problem.

$$\int x^2 \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Optimal (type 4, 74 leaves, 5 steps):

$$\frac{x^2}{4 b \pi}-\frac{x \text{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \text{FresnelC}[b x]}{b^2 \pi}+\frac{\text{FresnelC}[b x]^2}{2 b^3 \pi}+\frac{\text{Sin}\left[b^2 \pi x^2\right]}{4 b^3 \pi^2}$$

Result (type 8, 22 leaves):

$$\int x^2 \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Problem 208: Unable to integrate problem.

$$\int \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Optimal (type 5, 80 leaves, 1 step):

$$\frac{\text{FresnelC}[b x] \text{FresnelS}[b x]}{2 b}+\frac{1}{8} i b x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},-\frac{1}{2} i b^2 \pi x^2\right]-$$
$$\frac{1}{8} i b x^2 \text{HypergeometricPFQ}\left[\{1,1\},\left\{\frac{3}{2},2\right\},\frac{1}{2} i b^2 \pi x^2\right]$$

Result (type 8, 19 leaves):

$$\int \text{FresnelC}[b x] \text{Sin}\left[\frac{1}{2} b^2 \pi x^2\right] dx$$

Problem 210: Unable to integrate problem.

$$\int \frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{x^2}\,dx$$

Optimal (type 4, 48 leaves, 4 steps):

$$\frac{1}{2}\,b\,\pi\,\text{FresnelC}[b\,x]^2-\frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{x}+\frac{1}{4}\,b\,\text{SinIntegral}\left[b^2\,\pi\,x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{x^2}\,dx$$

Problem 214: Unable to integrate problem.

$$\int \frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{x^6}\,dx$$

Optimal (type 4, 163 leaves, 13 steps):

$$-\frac{b^3\,\pi}{60\,x^2}-\frac{b^3\,\pi\,\text{Cos}\left[b^2\,\pi\,x^2\right]}{24\,x^2}-\frac{b^2\,\pi\,\text{Cos}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]\,\text{FresnelC}[b\,x]}{15\,x^3}-\frac{1}{30}\,b^5\,\pi^3\,\text{FresnelC}[b\,x]^2-\frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{5\,x^5}+\frac{b^4\,\pi^2\,\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{15\,x}-\frac{b\,\text{Sin}\left[b^2\,\pi\,x^2\right]}{40\,x^4}-\frac{7}{120}\,b^5\,\pi^2\,\text{SinIntegral}\left[b^2\,\pi\,x^2\right]$$

Result (type 8, 22 leaves):

$$\int \frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{x^6}\,dx$$

Problem 218: Unable to integrate problem.

$$\int \frac{\text{FresnelC}[b\,x]\,\text{Sin}\left[\frac{1}{2}\,b^2\,\pi\,x^2\right]}{x^{10}}\,dx$$

Optimal (type 4, 278 leaves, 26 steps):

$$-\frac{b^3 \pi}{756 x^6}+\frac{b^7 \pi^3}{3780 x^2}-\frac{11 b^3 \pi \operatorname{Cos}\left[b^2 \pi x^2\right]}{3024 x^6}+\frac{5 b^7 \pi^3 \operatorname{Cos}\left[b^2 \pi x^2\right]}{2016 x^2}-\frac{b^2 \pi \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{63 x^7}+$$
$$\frac{b^6 \pi^3 \operatorname{Cos}\left[\frac{1}{2} b^2 \pi x^2\right] \operatorname{FresnelC}[b x]}{945 x^3}+\frac{b^9 \pi^5 \operatorname{FresnelC}[b x]^2}{1890}-\frac{\operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{9 x^9}+\frac{b^4 \pi^2 \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{315 x^5}-$$
$$\frac{b^8 \pi^4 \operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{945 x}-\frac{b \operatorname{Sin}\left[b^2 \pi x^2\right]}{144 x^8}+\frac{67 b^5 \pi^2 \operatorname{Sin}\left[b^2 \pi x^2\right]}{30240 x^4}+\frac{83 b^9 \pi^4 \operatorname{SinIntegral}\left[b^2 \pi x^2\right]}{30240}$$

Result (type 8, 22 leaves):

$$\int \frac{\operatorname{FresnelC}[b x] \operatorname{Sin}\left[\frac{1}{2} b^2 \pi x^2\right]}{x^{10}} \, dx$$

Test results for the 208 problems in "8.3 Exponential integral functions.m"

Problem 4: Unable to integrate problem.

$$\int \frac{\operatorname{ExpIntegralE}[1, b x]}{x} \, dx$$

Optimal (type 5, 32 leaves, 1 step):

$$b x \operatorname{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -b x]-\operatorname{EulerGamma} \operatorname{Log}[x]-\frac{1}{2} \operatorname{Log}[b x]^2$$

Result (type 8, 11 leaves):

$$\int \frac{\operatorname{ExpIntegralE}[1, b x]}{x} \, dx$$

Problem 5: Unable to integrate problem.

$$\int \frac{\operatorname{ExpIntegralE}[1, b x]}{x^2} \, dx$$

Optimal (type 4, 20 leaves, 1 step):

$$-\frac{\operatorname{ExpIntegralE}[1, b x]}{x}+\frac{\operatorname{ExpIntegralE}[2, b x]}{x}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x^2} \, dx$$

Problem 6: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x^3} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[1, b x]}{2 x^2} + \frac{\text{ExpIntegralE}[3, b x]}{2 x^2}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x^3} \, dx$$

Problem 7: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x^4} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[1, b x]}{3 x^3} + \frac{\text{ExpIntegralE}[4, b x]}{3 x^3}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x^4} \, dx$$

Problem 11: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x} \, dx$$

Optimal (type 4, 13 leaves, 1 step):

$$-\text{ExpIntegralE}[1, b x] + \text{ExpIntegralE}[2, b x]$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x} \, dx$$

Problem 12: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^2} \, dx$$

Optimal (type 5, 46 leaves, 2 steps):

$$-\frac{\text{ExpIntegralE}[2, b x]}{x} - b^2 x \,\text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -b x] + b \,\text{EulerGamma} \,\text{Log}[x] + \frac{1}{2} b \,\text{Log}[b x]^2$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^2} \, dx$$

Problem 13: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^3} \, dx$$

Optimal (type 4, 20 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[2, b x]}{x^2} + \frac{\text{ExpIntegralE}[3, b x]}{x^2}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^3} \, dx$$

Problem 14: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^4} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[2, b x]}{2 x^3} + \frac{\text{ExpIntegralE}[4, b x]}{2 x^3}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^4} \, dx$$

Problem 15: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^5} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[2, b x]}{3 x^4} + \frac{\text{ExpIntegralE}[5, b x]}{3 x^4}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^5} \, dx$$

Problem 19: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x} \, dx$$

Optimal (type 4, 19 leaves, 1 step):

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

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x} \, dx$$

Problem 20: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^2} \, dx$$

Optimal (type 4, 20 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[2, b x]}{x} + \frac{\text{ExpIntegralE}[3, b x]}{x}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^2} \, dx$$

Problem 21: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^3} \, dx$$

Optimal (type 5, 70 leaves, 3 steps):

$$\frac{b \, \text{ExpIntegralE}[2, b x]}{2 x} - \frac{\text{ExpIntegralE}[3, b x]}{2 x^2} + \frac{1}{2} b^3 x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -b x] - \frac{1}{2} b^2 \, \text{EulerGamma} \, \text{Log}[x] - \frac{1}{4} b^2 \, \text{Log}[b x]^2$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^3} \, dx$$

Problem 22: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^4} \, dx$$

Optimal (type 4, 20 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[3, b x]}{x^3} + \frac{\text{ExpIntegralE}[4, b x]}{x^3}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^4} \, dx$$

Problem 23: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^5} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[3, b x]}{2 x^4} + \frac{\text{ExpIntegralE}[5, b x]}{2 x^4}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^5} \, dx$$

Problem 24: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^6} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[3, b x]}{3 x^5} + \frac{\text{ExpIntegralE}[6, b x]}{3 x^5}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^6} \, dx$$

Problem 29: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-1, b x]}{x} \, dx$$

Optimal (type 4, 19 leaves, 1 step):

$$-\frac{1}{2} \text{ExpIntegralE}[-1, b x] + \frac{1}{2} \text{ExpIntegralE}[1, b x]$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-1, b x]}{x} \, dx$$

Problem 30: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-1, b x]}{x^2} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

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

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-1, b x]}{x^2} \, dx$$

Problem 31: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-1, b\,x]}{x^3} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[-1, b\,x]}{4\,x^2} + \frac{\text{ExpIntegralE}[3, b\,x]}{4\,x^2}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-1, b\,x]}{x^3} \, dx$$

Problem 37: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-2, b\,x]}{x} \, dx$$

Optimal (type 4, 19 leaves, 1 step):

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

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-2, b\,x]}{x} \, dx$$

Problem 38: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-2, b\,x]}{x^2} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[-2, b\,x]}{4\,x} + \frac{\text{ExpIntegralE}[2, b\,x]}{4\,x}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-2, b\,x]}{x^2} \, dx$$

Problem 39: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-2, b x]}{x^3} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[-2, b x]}{5 x^2} + \frac{\text{ExpIntegralE}[3, b x]}{5 x^2}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-2, b x]}{x^3} \, dx$$

Problem 40: Result more than twice size of optimal antiderivative.

$$\int x^5 \, \text{ExpIntegralE}[-3, b x] \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{1}{2} x^6 \, \text{ExpIntegralE}[-5, b x] + \frac{1}{2} x^6 \, \text{ExpIntegralE}[-3, b x]$$

Result (type 4, 60 leaves):

$$-\frac{e^{-b x} \left(60 + 60 b x + 20 b^2 x^2 + b^5 e^{b x} x^5 \, \text{ExpIntegralE}[-2, b x] + 5 b^4 e^{b x} x^4 \, \text{ExpIntegralE}[-1, b x]\right)}{b^6}$$

Problem 41: Result more than twice size of optimal antiderivative.

$$\int x^4 \, \text{ExpIntegralE}[-3, b x] \, dx$$

Optimal (type 4, 20 leaves, 1 step):

$$-x^5 \, \text{ExpIntegralE}[-4, b x] + x^5 \, \text{ExpIntegralE}[-3, b x]$$

Result (type 4, 49 leaves):

$$-\frac{b^4 x^4 \, \text{ExpIntegralE}[-2, b x] + 4 e^{-b x} \left(6 + 3 b x + b^3 e^{b x} x^3 \, \text{ExpIntegralE}[-1, b x]\right)}{b^5}$$

Problem 43: Result more than twice size of optimal antiderivative.

$$\int x^2 \text{ExpIntegralE}[-3, b x] \, dx$$

Optimal (type 4, 20 leaves, 1 step):

$$-x^3 \text{ExpIntegralE}[-3, b x] + x^3 \text{ExpIntegralE}[-2, b x]$$

Result (type 4, 42 leaves):

$$-\frac{2 e^{-b x} + b^3 x^3 \text{ExpIntegralE}[-2, b x] + 2 b^2 x^2 \text{ExpIntegralE}[-1, b x]}{b^4 x}$$

Problem 46: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-3, b x]}{x} \, dx$$

Optimal (type 4, 19 leaves, 1 step):

$$-\frac{1}{4} \text{ExpIntegralE}[-3, b x] + \frac{1}{4} \text{ExpIntegralE}[1, b x]$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-3, b x]}{x} \, dx$$

Problem 47: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-3, b x]}{x^2} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[-3, b x]}{5 x} + \frac{\text{ExpIntegralE}[2, b x]}{5 x}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-3, b x]}{x^2} \, dx$$

Problem 48: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-3, b x]}{x^3} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$-\frac{\text{ExpIntegralE}[-3, b x]}{6 x^2} + \frac{\text{ExpIntegralE}[3, b x]}{6 x^2}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[-3, b x]}{x^3} \, dx$$

Problem 53: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x} \, dx$$

Optimal (type 5, 32 leaves, 1 step):

$$b x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -b x] - \text{EulerGamma} \, \text{Log}[x] - \frac{1}{2} \text{Log}[b x]^2$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[1, b x]}{x} \, dx$$

Problem 54: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^2} \, dx$$

Optimal (type 5, 46 leaves, 2 steps):

$$-\frac{\text{ExpIntegralE}[2, b x]}{x} - b^2 x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -b x] + b \, \text{EulerGamma} \, \text{Log}[x] + \frac{1}{2} b \, \text{Log}[b x]^2$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[2, b x]}{x^2} \, dx$$

Problem 55: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^3} \, dx$$

Optimal (type 5, 70 leaves, 3 steps):

$$\frac{b \, \text{ExpIntegralE}[2, b x]}{2 x} - \frac{\text{ExpIntegralE}[3, b x]}{2 x^2} + \frac{1}{2} b^3 x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -b x] - \frac{1}{2} b^2 \, \text{EulerGamma} \, \text{Log}[x] - \frac{1}{4} b^2 \, \text{Log}[b x]^2$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[3, b x]}{x^3} \, dx$$

Problem 56: Unable to integrate problem.

$$\int (d x)^{3/2} \, \text{ExpIntegralE}\left[-\frac{3}{2}, b x\right] dx$$

Optimal (type 5, 62 leaves, 1 step):

$$-\frac{4 (d x)^{5/2} \, \text{HypergeometricPFQ}\left[\left\{\frac{5}{2}, \frac{5}{2}\right\}, \left\{\frac{7}{2}, \frac{7}{2}\right\}, -b x\right]}{25 d} + \frac{3 \sqrt{\pi} \, (d x)^{3/2} \, \text{Log}[x]}{4 b (b x)^{3/2}}$$

Result (type 8, 17 leaves):

$$\int (d x)^{3/2} \, \text{ExpIntegralE}\left[-\frac{3}{2}, b x\right] dx$$

Problem 57: Unable to integrate problem.

$$\int \sqrt{d x} \, \text{ExpIntegralE}\left[-\frac{1}{2}, b x\right] dx$$

Optimal (type 5, 62 leaves, 1 step):

$$-\frac{4 (d x)^{3/2} \, \text{HypergeometricPFQ}\left[\left\{\frac{3}{2}, \frac{3}{2}\right\}, \left\{\frac{5}{2}, \frac{5}{2}\right\}, -b x\right]}{9 d} + \frac{\sqrt{\pi} \sqrt{d x} \, \text{Log}[x]}{2 b \sqrt{b x}}$$

Result (type 8, 17 leaves):

$$\int \sqrt{d x} \, \text{ExpIntegralE}\left[-\frac{1}{2}, b x\right] dx$$

Problem 58: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}\left[\frac{1}{2}, b x\right]}{\sqrt{d x}} \, dx$$

Optimal (type 5, 57 leaves, 1 step):

$$-\frac{4 \sqrt{d x} \, \text{HypergeometricPFQ}\left[\left\{\frac{1}{2}, \frac{1}{2}\right\}, \left\{\frac{3}{2}, \frac{3}{2}\right\}, -b x\right]}{d} + \frac{\sqrt{\pi} \sqrt{b x} \, \text{Log}[x]}{b \sqrt{d x}}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}\left[\frac{1}{2}, b x\right]}{\sqrt{d x}} \, dx$$

Problem 59: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}\left[\frac{3}{2}, b x\right]}{(d x)^{3/2}} \, dx$$

Optimal (type 5, 58 leaves, 1 step):

$$-\frac{4 \, \text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{2}\right\}, \left\{\frac{1}{2}, \frac{1}{2}\right\}, -b x\right]}{d \sqrt{d x}} - \frac{2 \sqrt{\pi} \, (b x)^{3/2} \, \text{Log}[x]}{b \, (d x)^{3/2}}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}\left[\frac{3}{2}, b x\right]}{(d x)^{3/2}} \, dx$$

Problem 60: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}\left[\frac{5}{2}, b x\right]}{(d x)^{5/2}} \, dx$$

Optimal (type 5, 62 leaves, 1 step):

$$-\frac{4 \, \text{HypergeometricPFQ}\left[\left\{-\frac{3}{2}, -\frac{3}{2}\right\}, \left\{-\frac{1}{2}, -\frac{1}{2}\right\}, -b x\right]}{9 d \, (d x)^{3/2}} + \frac{4 \sqrt{\pi} \, (b x)^{5/2} \, \text{Log}[x]}{3 b \, (d x)^{5/2}}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}\left[\frac{5}{2}, b\,x\right]}{(d\,x)^{5/2}}\,dx$$

Problem 61: Unable to integrate problem.

$$\int x^m\,\text{ExpIntegralE}[n, x]\,dx$$

Optimal (type 4, 32 leaves, 1 step):

$$-\frac{x^{1+m}\,\text{ExpIntegralE}[-m, x]}{m+n}+\frac{x^{1+m}\,\text{ExpIntegralE}[n, x]}{m+n}$$

Result (type 8, 9 leaves):

$$\int x^m\,\text{ExpIntegralE}[n, x]\,dx$$

Problem 62: Unable to integrate problem.

$$\int x^m\,\text{ExpIntegralE}[n, b\,x]\,dx$$

Optimal (type 4, 36 leaves, 1 step):

$$-\frac{x^{1+m}\,\text{ExpIntegralE}[-m, b\,x]}{m+n}+\frac{x^{1+m}\,\text{ExpIntegralE}[n, b\,x]}{m+n}$$

Result (type 8, 11 leaves):

$$\int x^m\,\text{ExpIntegralE}[n, b\,x]\,dx$$

Problem 63: Unable to integrate problem.

$$\int (d\,x)^m\,\text{ExpIntegralE}[n, x]\,dx$$

Optimal (type 4, 42 leaves, 1 step):

$$-\frac{(d\,x)^{1+m}\,\text{ExpIntegralE}[-m, x]}{d\,(m+n)}+\frac{(d\,x)^{1+m}\,\text{ExpIntegralE}[n, x]}{d\,(m+n)}$$

Result (type 8, 11 leaves):

$$\int (d\,x)^m \,\text{ExpIntegralE}[n,\,x]\,dx$$

Problem 64: Unable to integrate problem.

$$\int (d\,x)^m \,\text{ExpIntegralE}[n,\,b\,x]\,dx$$

Optimal (type 4, 46 leaves, 1 step):

$$-\frac{(d\,x)^{1+m}\,\text{ExpIntegralE}[-m,\,b\,x]}{d\,(m+n)}+\frac{(d\,x)^{1+m}\,\text{ExpIntegralE}[n,\,b\,x]}{d\,(m+n)}$$

Result (type 8, 13 leaves):

$$\int (d\,x)^m \,\text{ExpIntegralE}[n,\,b\,x]\,dx$$

Problem 65: Unable to integrate problem.

$$\int x^{-n}\,\text{ExpIntegralE}[n,\,x]\,dx$$

Optimal (type 5, 52 leaves, 1 step):

$$-\frac{x^{1-n}\,\text{HypergeometricPFQ}[\{1-n,\,1-n\},\,\{2-n,\,2-n\},\,-x]}{(1-n)^2}+\text{Gamma}[1-n]\,\text{Log}[x]$$

Result (type 8, 11 leaves):

$$\int x^{-n}\,\text{ExpIntegralE}[n,\,x]\,dx$$

Problem 66: Unable to integrate problem.

$$\int x^{-n}\,\text{ExpIntegralE}[n,\,b\,x]\,dx$$

Optimal (type 5, 66 leaves, 1 step):

$$-\frac{x^{1-n}\,\text{HypergeometricPFQ}[\{1-n,\,1-n\},\,\{2-n,\,2-n\},\,-b\,x]}{(1-n)^2}+\frac{x^{-n}\,(b\,x)^n\,\text{Gamma}[1-n]\,\text{Log}[x]}{b}$$

Result (type 8, 13 leaves):

$$\int x^{-n}\,\text{ExpIntegralE}[n,\,b\,x]\,dx$$

Problem 67: Unable to integrate problem.

$$\int (d\,x)^{-n}\,\text{ExpIntegralE}[n,x]\,dx$$

Optimal (type 5, 67 leaves, 1 step):

$$-\frac{(d\,x)^{1-n}\,\text{HypergeometricPFQ}[\{1-n,1-n\},\{2-n,2-n\},-x]}{d\,(1-n)^2}+x^n\,(d\,x)^{-n}\,\text{Gamma}[1-n]\,\text{Log}[x]$$

Result (type 8, 13 leaves):

$$\int (d\,x)^{-n}\,\text{ExpIntegralE}[n,x]\,dx$$

Problem 68: Unable to integrate problem.

$$\int (d\,x)^{-n}\,\text{ExpIntegralE}[n,b\,x]\,dx$$

Optimal (type 5, 73 leaves, 1 step):

$$-\frac{(d\,x)^{1-n}\,\text{HypergeometricPFQ}[\{1-n,1-n\},\{2-n,2-n\},-b\,x]}{d\,(1-n)^2}+\frac{(b\,x)^n\,(d\,x)^{-n}\,\text{Gamma}[1-n]\,\text{Log}[x]}{b}$$

Result (type 8, 15 leaves):

$$\int (d\,x)^{-n}\,\text{ExpIntegralE}[n,b\,x]\,dx$$

Problem 72: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[n,b\,x]}{x}\,dx$$

Optimal (type 4, 28 leaves, 1 step):

$$\frac{\text{ExpIntegralE}[1,b\,x]}{1-n}-\frac{\text{ExpIntegralE}[n,b\,x]}{1-n}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[n,b\,x]}{x}\,dx$$

Problem 73: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[n, b x]}{x^2} \, dx$$

Optimal (type 4, 34 leaves, 1 step):

$$\frac{\text{ExpIntegralE}[2, b x]}{(2-n) x} - \frac{\text{ExpIntegralE}[n, b x]}{(2-n) x}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[n, b x]}{x^2} \, dx$$

Problem 74: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[n, b x]}{x^3} \, dx$$

Optimal (type 4, 34 leaves, 1 step):

$$\frac{\text{ExpIntegralE}[3, b x]}{(3-n) x^2} - \frac{\text{ExpIntegralE}[n, b x]}{(3-n) x^2}$$

Result (type 8, 11 leaves):

$$\int \frac{\text{ExpIntegralE}[n, b x]}{x^3} \, dx$$

Problem 80: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[1, a + b x]}{(c + d x)^2} \, dx$$

Optimal (type 4, 84 leaves, 5 steps):

$$-\frac{\text{ExpIntegralE}[1, a + b x]}{d (c + d x)} - \frac{b \, \text{ExpIntegralEi}[-a - b x]}{d (b c - a d)} + \frac{b \, e^{-a + \frac{b c}{d}} \, \text{ExpIntegralEi}\left[-\frac{b (c + d x)}{d}\right]}{d (b c - a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[1, a + b x]}{(c + d x)^2} \, dx$$

Problem 81: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[1, a+b x]}{(c+d x)^3} \, dx$$

Optimal (type 4, 174 leaves, 7 steps):

$$-\frac{b\, e^{-a-b x}}{2 d (b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[1, a+b x]}{2 d (c+d x)^2}-\frac{b^2\, \text{ExpIntegralEi}[-a-b x]}{2 d (b c-a d)^2}+\frac{b^2\, e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{2 d (b c-a d)^2}-\frac{b^2\, e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{2 d^2 (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[1, a+b x]}{(c+d x)^3} \, dx$$

Problem 82: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[1, a+b x]}{(c+d x)^4} \, dx$$

Optimal (type 4, 292 leaves, 10 steps):

$$-\frac{b\, e^{-a-b x}}{6 d (b c-a d) (c+d x)^2}-\frac{b^2\, e^{-a-b x}}{3 d (b c-a d)^2 (c+d x)}+\frac{b^2\, e^{-a-b x}}{6 d^2 (b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[1, a+b x]}{3 d (c+d x)^3}-\frac{b^3\, \text{ExpIntegralEi}[-a-b x]}{3 d (b c-a d)^3}+\frac{b^3\, e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{3 d (b c-a d)^3}-\frac{b^3\, e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{3 d^2 (b c-a d)^2}+\frac{b^3\, e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{6 d^3 (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[1, a+b x]}{(c+d x)^4} \, dx$$

Problem 89: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2, a+b x]}{(c+d x)^3} \, dx$$

Optimal (type 4, 117 leaves, 6 steps):

$$\frac{b\,\text{ExpIntegralE}[1,a+b x]}{2 d^2 (c+d x)}-\frac{\text{ExpIntegralE}[2,a+b x]}{2 d (c+d x)^2}+\frac{b^2\,\text{ExpIntegralEi}[-a-b x]}{2 d^2 (b c-a d)}-\frac{b^2 e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{2 d^2 (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[2,a+b x]}{(c+d x)^3}\,dx$$

Problem 90: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[2,a+b x]}{(c+d x)^4}\,dx$$

Optimal (type 4, 198 leaves, 8 steps):

$$\frac{b^2 e^{-a-b x}}{6 d^2 (b c-a d) (c+d x)}+\frac{b\,\text{ExpIntegralE}[1,a+b x]}{6 d^2 (c+d x)^2}-\frac{\text{ExpIntegralE}[2,a+b x]}{3 d (c+d x)^3}+$$
$$\frac{b^3\,\text{ExpIntegralEi}[-a-b x]}{6 d^2 (b c-a d)^2}-\frac{b^3 e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{6 d^2 (b c-a d)^2}+\frac{b^3 e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{6 d^3 (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[2,a+b x]}{(c+d x)^4}\,dx$$

Problem 98: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[3,a+b x]}{(c+d x)^4}\,dx$$

Optimal (type 4, 141 leaves, 7 steps):

$$-\frac{b^2\,\text{ExpIntegralE}[1,a+b x]}{6 d^3 (c+d x)}+\frac{b\,\text{ExpIntegralE}[2,a+b x]}{6 d^2 (c+d x)^2}-$$
$$\frac{\text{ExpIntegralE}[3,a+b x]}{3 d (c+d x)^3}-\frac{b^3\,\text{ExpIntegralEi}[-a-b x]}{6 d^3 (b c-a d)}+\frac{b^3 e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{6 d^3 (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[3, a + b x]}{(c + d x)^4} \, dx$$

Problem 104: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-1, a + b x]}{c + d x} \, dx$$

Optimal (type 4, 157 leaves, 7 steps):

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

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[-1, a + b x]}{c + d x} \, dx$$

Problem 105: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-1, a + b x]}{(c + d x)^2} \, dx$$

Optimal (type 4, 258 leaves, 10 steps):

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

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[-1, a + b x]}{(c + d x)^2} \, dx$$

Problem 106: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-1, a + b x]}{(c + d x)^3} \, dx$$

Optimal (type 4, 416 leaves, 14 steps):

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

Result (type 8, 17 leaves) :

$$\int\frac{\text{ExpIntegralE}[-1, a+b x]}{(c+d x)^3}\,dx$$

Problem 112: Unable to integrate problem.

$$\int\frac{\text{ExpIntegralE}[-2, a+b x]}{c+d x}\,dx$$

Optimal (type 4, 287 leaves, 11 steps) :

$$\frac{d^2 e^{-a-b x}}{b^2 (b c-a d) (c+d x)^2}+\frac{d\,e^{-a-b x}}{b^2 (a+b x) (c+d x)^2}+\frac{2 d^2 e^{-a-b x}}{b (b c-a d)^2 (c+d x)}-\frac{d\,e^{-a-b x}}{b (b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[-1, a+b x]}{b (c+d x)}+$$
$$\frac{2 d^2\,\text{ExpIntegralEi}[-a-b x]}{(b c-a d)^3}-\frac{2 d^2 e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^3}+\frac{2 d\,e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^2}-\frac{e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{b c-a d}$$

Result (type 8, 17 leaves) :

$$\int\frac{\text{ExpIntegralE}[-2, a+b x]}{c+d x}\,dx$$

Problem 113: Unable to integrate problem.

$$\int\frac{\text{ExpIntegralE}[-2, a+b x]}{(c+d x)^2}\,dx$$

Optimal (type 4, 422 leaves, 15 steps) :

$$\frac{2 d^2 e^{-a-b x}}{b^2 (b c-a d) (c+d x)^3}+\frac{2 d e^{-a-b x}}{b^2 (a+b x) (c+d x)^3}+\frac{3 d^2 e^{-a-b x}}{b (b c-a d)^2 (c+d x)^2}-\frac{d e^{-a-b x}}{b (b c-a d) (c+d x)^2}+\frac{6 d^2 e^{-a-b x}}{(b c-a d)^3 (c+d x)}-\frac{3 d e^{-a-b x}}{(b c-a d)^2 (c+d x)}+$$
$$\frac{e^{-a-b x}}{(b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[-1,a+b x]}{b (c+d x)^2}+\frac{6 b d^2 \text{ExpIntegralEi}[-a-b x]}{(b c-a d)^4}-\frac{6 b d^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^4}+$$
$$\frac{6 b d e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^3}-\frac{3 b e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^2}+\frac{b e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{d (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[-2,a+b x]}{(c+d x)^2} \, dx$$

Problem 114: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-2,a+b x]}{(c+d x)^3} \, dx$$

Optimal (type 4, 609 leaves, 20 steps):

$$\frac{3 d^2 e^{-a-b x}}{b^2 (b c-a d) (c+d x)^4}+\frac{3 d e^{-a-b x}}{b^2 (a+b x) (c+d x)^4}+\frac{4 d^2 e^{-a-b x}}{b (b c-a d)^2 (c+d x)^3}-\frac{d e^{-a-b x}}{b (b c-a d) (c+d x)^3}+\frac{6 d^2 e^{-a-b x}}{(b c-a d)^3 (c+d x)^2}-\frac{2 d e^{-a-b x}}{(b c-a d)^2 (c+d x)^2}+$$
$$\frac{e^{-a-b x}}{2 (b c-a d) (c+d x)^2}+\frac{12 b d^2 e^{-a-b x}}{(b c-a d)^4 (c+d x)}-\frac{6 b d e^{-a-b x}}{(b c-a d)^3 (c+d x)}+\frac{2 b e^{-a-b x}}{(b c-a d)^2 (c+d x)}-\frac{b e^{-a-b x}}{2 d (b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[-1,a+b x]}{b (c+d x)^3}+$$
$$\frac{12 b^2 d^2 \text{ExpIntegralEi}[-a-b x]}{(b c-a d)^5}-\frac{12 b^2 d^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^5}+\frac{12 b^2 d e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^4}-$$
$$\frac{6 b^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^3}+\frac{2 b^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{d (b c-a d)^2}-\frac{b^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{2 d^2 (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[-2,a+b x]}{(c+d x)^3} \, dx$$

Problem 120: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-3, a+b x]}{c+d x} \, dx$$

Optimal (type 4, 453 leaves, 16 steps):

$$-\frac{2 d^3 e^{-a-b x}}{b^3 (b c-a d) (c+d x)^3}-\frac{2 d^2 e^{-a-b x}}{b^3 (a+b x) (c+d x)^3}-\frac{3 d^3 e^{-a-b x}}{b^2 (b c-a d)^2 (c+d x)^2}+\frac{d^2 e^{-a-b x}}{b^2 (b c-a d) (c+d x)^2}-\frac{6 d^3 e^{-a-b x}}{b (b c-a d)^3 (c+d x)}+\frac{3 d^2 e^{-a-b x}}{b (b c-a d)^2 (c+d x)}-\frac{d e^{-a-b x}}{b (b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[-2, a+b x]}{b (c+d x)}+\frac{d \,\text{ExpIntegralE}[-1, a+b x]}{b^2 (c+d x)^2}-\frac{6 d^3 \,\text{ExpIntegralEi}[-a-b x]}{(b c-a d)^4}+\frac{6 d^3 e^{-a+\frac{b c}{d}} \,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^4}-\frac{6 d^2 e^{-a+\frac{b c}{d}} \,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^3}+\frac{3 d e^{-a+\frac{b c}{d}} \,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^2}-\frac{e^{-a+\frac{b c}{d}} \,\text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{b c-a d}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[-3, a+b x]}{c+d x} \, dx$$

Problem 121: Unable to integrate problem.

$$\int \frac{\text{ExpIntegralE}[-3, a+b x]}{(c+d x)^2} \, dx$$

Optimal (type 4, 621 leaves, 21 steps):

$$-\frac{6 d^3 e^{-a-b x}}{b^3 (b c-a d) (c+d x)^4}-\frac{6 d^2 e^{-a-b x}}{b^3 (a+b x) (c+d x)^4}-\frac{8 d^3 e^{-a-b x}}{b^2 (b c-a d)^2 (c+d x)^3}+\frac{2 d^2 e^{-a-b x}}{b^2 (b c-a d) (c+d x)^3}-\frac{12 d^3 e^{-a-b x}}{b (b c-a d)^3 (c+d x)^2}+\frac{4 d^2 e^{-a-b x}}{b (b c-a d)^2 (c+d x)^2}-\frac{d e^{-a-b x}}{b (b c-a d) (c+d x)^2}-\frac{24 d^3 e^{-a-b x}}{(b c-a d)^4 (c+d x)}+\frac{12 d^2 e^{-a-b x}}{(b c-a d)^3 (c+d x)}-\frac{4 d e^{-a-b x}}{(b c-a d)^2 (c+d x)}+\frac{e^{-a-b x}}{(b c-a d) (c+d x)}-\frac{\text{ExpIntegralE}[-2, a+b x]}{b (c+d x)^2}+\frac{2 d\, \text{ExpIntegralE}[-1, a+b x]}{b^2 (c+d x)^3}-\frac{24 b d^3\, \text{ExpIntegralEi}[-a-b x]}{(b c-a d)^5}+\frac{24 b d^3 e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^5}-\frac{24 b d^2 e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^4}+\frac{12 b d e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^3}-\frac{4 b e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{(b c-a d)^2}+\frac{b e^{-a+\frac{b c}{d}}\, \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{d (b c-a d)}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{ExpIntegralE}[-3, a+b x]}{(c+d x)^2}\, dx$$

Problem 182: Unable to integrate problem.

$$\int \frac{e^{b x}\, \text{ExpIntegralEi}[b x]}{x^3}\, dx$$

Optimal (type 4, 82 leaves, 10 steps):

$$-\frac{e^{2 b x}}{4 x^2}-\frac{b e^{2 b x}}{x}-\frac{e^{b x}\, \text{ExpIntegralEi}[b x]}{2 x^2}-\frac{b e^{b x}\, \text{ExpIntegralEi}[b x]}{2 x}+\frac{1}{4} b^2\, \text{ExpIntegralEi}[b x]^2+2 b^2\, \text{ExpIntegralEi}[2 b x]$$

Result (type 8, 15 leaves):

$$\int \frac{e^{b x}\, \text{ExpIntegralEi}[b x]}{x^3}\, dx$$

Problem 183: Unable to integrate problem.

$$\int \frac{e^{b x}\, \text{ExpIntegralEi}[b x]}{x^2}\, dx$$

Optimal (type 4, 45 leaves, 5 steps):

$$-\frac{e^{2 b x}}{x}-\frac{e^{b x}\, \text{ExpIntegralEi}[b x]}{x}+\frac{1}{2} b\, \text{ExpIntegralEi}[b x]^2+2 b\, \text{ExpIntegralEi}[2 b x]$$

Result (type 8, 15 leaves):

$$\int \frac{e^{b x} \text{ExpIntegralEi}[b x]}{x^2} \, dx$$

Test results for the 136 problems in "8.4 Trig integral functions.m"

Problem 6: Unable to integrate problem.

$$\int \frac{\text{SinIntegral}[b x]}{x} \, dx$$

Optimal (type 5, 43 leaves, 1 step):

$$\frac{1}{2} b x \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -i b x] + \frac{1}{2} b x \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, i b x]$$

Result (type 8, 10 leaves):

$$\int \frac{\text{SinIntegral}[b x]}{x} \, dx$$

Problem 39: Unable to integrate problem.

$$\int \frac{\text{Sin}[b x] \text{SinIntegral}[b x]}{x^3} \, dx$$

Optimal (type 4, 96 leaves, 14 steps):

$$b^2 \text{CosIntegral}[2 b x] - \frac{b \text{Cos}[b x] \text{Sin}[b x]}{2 x} - \frac{\text{Sin}[b x]^2}{4 x^2} - \frac{b \text{Sin}[2 b x]}{4 x} - \frac{b \text{Cos}[b x] \text{SinIntegral}[b x]}{2 x} - \frac{\text{Sin}[b x] \text{SinIntegral}[b x]}{2 x^2} - \frac{1}{4} b^2 \text{SinIntegral}[b x]^2$$

Result (type 8, 14 leaves):

$$\int \frac{\text{Sin}[b x] \text{SinIntegral}[b x]}{x^3} \, dx$$

Problem 41: Unable to integrate problem.

$$\int \frac{\text{Sin}[b x] \text{SinIntegral}[b x]}{x} \, dx$$

Optimal (type 4, 10 leaves, 1 step):

$$\frac{1}{2}\,\text{SinIntegral}[b\,x]^2$$

Result (type 9, 26 leaves):

$$\frac{\text{Sin}[b\,x]\,\text{SinIntegral}[b\,x]^2}{2\,b\,x\,\text{Sinc}[b\,x]}$$

Problem 47: Unable to integrate problem.

$$\int \frac{\text{Cos}[b\,x]\,\text{SinIntegral}[b\,x]}{x^2}\,dx$$

Optimal (type 4, 44 leaves, 7 steps):

$$b\,\text{CosIntegral}[2\,b\,x]-\frac{\text{Sin}[2\,b\,x]}{2\,x}-\frac{\text{Cos}[b\,x]\,\text{SinIntegral}[b\,x]}{x}-\frac{1}{2}\,b\,\text{SinIntegral}[b\,x]^2$$

Result (type 8, 14 leaves):

$$\int \frac{\text{Cos}[b\,x]\,\text{SinIntegral}[b\,x]}{x^2}\,dx$$

Problem 63: Result unnecessarily involves imaginary or complex numbers.

$$\int x\,\text{Sin}[a+b\,x]\,\text{SinIntegral}[c+d\,x]\,dx$$

Optimal (type 4, 371 leaves, 24 steps):

$$\frac{\text{Cos}\left[a-c+\left(b-d\right)\,x\right]}{2\,b\,\left(b-d\right)}-\frac{\text{Cos}\left[a+c+\left(b+d\right)\,x\right]}{2\,b\,\left(b+d\right)}-\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)\,x\right]}{2\,b^2}+$$
$$\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)\,x\right]}{2\,b^2}+\frac{c\,\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)\,x\right]\,\text{Sin}\left[a-\frac{b\,c}{d}\right]}{2\,b\,d}-\frac{c\,\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)\,x\right]\,\text{Sin}\left[a-\frac{b\,c}{d}\right]}{2\,b\,d}+$$
$$\frac{c\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)\,x\right]}{2\,b\,d}+\frac{\text{Sin}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)\,x\right]}{2\,b^2}-\frac{x\,\text{Cos}[a+b\,x]\,\text{SinIntegral}[c+d\,x]}{b}+$$
$$\frac{\text{Sin}[a+b\,x]\,\text{SinIntegral}[c+d\,x]}{b^2}-\frac{c\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)\,x\right]}{2\,b\,d}-\frac{\text{Sin}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)\,x\right]}{2\,b^2}$$

Result (type 4, 345 leaves):

$$\frac{1}{4 b^2 d} e^{-i (a+c)} \left(b d \left(-\frac{e^{-i (b+d) x}}{b+d} + \frac{e^{i (2 a+b x-d x)}}{b-d}\right) - i (b c - i d) e^{\frac{i(-b c+(2a+c) d)}{d}} \text{ExpIntegralEi}\left[\frac{i (b-d)(c+d x)}{d}\right] + (-i b c + d) e^{\frac{i c (b+d)}{d}} \text{ExpIntegralEi}\left[-\frac{i (b+d)(c+d x)}{d}\right]\right) + \frac{1}{4 b^2 d} e^{-i(a-c)} \left(b d\left(\frac{e^{-i(b-d)x}}{b-d} - \frac{e^{i(2a+(b+d)x)}}{b+d}\right) + i (b c + i d) e^{\frac{i c (b-d)}{d}} \text{ExpIntegralEi}\left[-\frac{i(b-d)(c+dx)}{d}\right] + (i b c + d) e^{-\frac{i(bc-2ad+cd)}{d}} \text{ExpIntegralEi}\left[\frac{i(b+d)(c+dx)}{d}\right]\right) - \frac{(b x \text{Cos}[a+bx] - \text{Sin}[a+bx]) \text{SinIntegral}[c+dx]}{b^2}$$

Problem 64: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Sin}[a+b x]\, \text{SinIntegral}[c+d x]\, dx$$

Optimal (type 4, 154 leaves, 9 steps):

$$-\frac{\text{CosIntegral}\left[\frac{c(b-d)}{d} + (b-d)x\right] \text{Sin}\left[a - \frac{bc}{d}\right]}{2b} + \frac{\text{CosIntegral}\left[\frac{c(b+d)}{d}+(b+d)x\right]\text{Sin}\left[a-\frac{bc}{d}\right]}{2b} - \frac{\text{Cos}\left[a-\frac{bc}{d}\right] \text{SinIntegral}\left[\frac{c(b-d)}{d}+(b-d)x\right]}{2b} - \frac{\text{Cos}[a+bx]\,\text{SinIntegral}[c+dx]}{b} + \frac{\text{Cos}\left[a-\frac{bc}{d}\right]\text{SinIntegral}\left[\frac{c(b+d)}{d}+(b+d)x\right]}{2b}$$

Result (type 4, 168 leaves):

$$\frac{1}{4b} i e^{-\frac{i(bc+ad)}{d}} \left(-e^{\frac{2ibc}{d}} \text{ExpIntegralEi}\left[-\frac{i(b-d)(c+dx)}{d}\right] + e^{2ia}\text{ExpIntegralEi}\left[\frac{i(b-d)(c+dx)}{d}\right] + e^{\frac{2ibc}{d}}\text{ExpIntegralEi}\left[-\frac{i(b+d)(c+dx)}{d}\right] - e^{2ia}\text{ExpIntegralEi}\left[\frac{i(b+d)(c+dx)}{d}\right] + 4 i e^{\frac{i(bc+ad)}{d}} \text{Cos}[a+bx]\,\text{SinIntegral}[c+dx]\right)$$

Problem 66: Result unnecessarily involves imaginary or complex numbers.

$$\int x\, \text{Cos}[a+b x]\, \text{SinIntegral}[c+d x]\, dx$$

Optimal (type 4, 370 leaves, 24 steps):

$$\frac{c\,\text{Cos}\left[a-\frac{b c}{d}\right]\text{CosIntegral}\left[\frac{c (b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}-\frac{c\,\text{Cos}\left[a-\frac{b c}{d}\right]\text{CosIntegral}\left[\frac{c (b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}+$$
$$\frac{\text{CosIntegral}\left[\frac{c (b-d)}{d}+(b-d)\,x\right]\text{Sin}\left[a-\frac{b c}{d}\right]}{2\,b^2}-\frac{\text{CosIntegral}\left[\frac{c (b+d)}{d}+(b+d)\,x\right]\text{Sin}\left[a-\frac{b c}{d}\right]}{2\,b^2}-\frac{\text{Sin}\left[a-c+(b-d)\,x\right]}{2\,b\,(b-d)}+\frac{\text{Sin}\left[a+c+(b+d)\,x\right]}{2\,b\,(b+d)}+$$
$$\frac{\text{Cos}\left[a-\frac{b c}{d}\right]\text{SinIntegral}\left[\frac{c (b-d)}{d}+(b-d)\,x\right]}{2\,b^2}-\frac{c\,\text{Sin}\left[a-\frac{b c}{d}\right]\text{SinIntegral}\left[\frac{c (b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}+\frac{\text{Cos}[a+b\,x]\,\text{SinIntegral}[c+d\,x]}{b^2}+$$
$$\frac{x\,\text{Sin}[a+b\,x]\,\text{SinIntegral}[c+d\,x]}{b}-\frac{\text{Cos}\left[a-\frac{b c}{d}\right]\text{SinIntegral}\left[\frac{c (b+d)}{d}+(b+d)\,x\right]}{2\,b^2}+\frac{c\,\text{Sin}\left[a-\frac{b c}{d}\right]\text{SinIntegral}\left[\frac{c (b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}$$

Result (type 4, 343 leaves):

$$-\frac{1}{4\,b^2\,d}e^{-i\,(a+c)}\left(-i\,b\,d\left(\frac{e^{-i\,(b+d)\,x}}{b+d}+\frac{e^{i\,(2\,a+(b-d)\,x)}}{b-d}\right)+\right.$$
$$\left.(-b\,c+i\,d)\,e^{\frac{i\,(-b\,c+(2\,a+c)\,d)}{d}}\,\text{ExpIntegralEi}\left[\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+(b\,c+i\,d)\,e^{\frac{i\,c\,(b+d)}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)+$$
$$\frac{1}{4\,b^2\,d}e^{-i\,(a-c)}\left(-i\,b\,d\left(\frac{e^{-i\,(b-d)\,x}}{b-d}+\frac{e^{i\,(2\,a+(b+d)\,x)}}{b+d}\right)+(b\,c+i\,d)\,e^{\frac{i\,c\,(b-d)}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+\right.$$
$$\left.(-b\,c+i\,d)\,e^{2\,i\,a-\frac{i\,c\,(b+d)}{d}}\,\text{ExpIntegralEi}\left[\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)+\frac{(\text{Cos}[a+b\,x]+b\,x\,\text{Sin}[a+b\,x])\,\text{SinIntegral}[c+d\,x]}{b^2}$$

Problem 67: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Cos}[a+b\,x]\,\text{SinIntegral}[c+d\,x]\,dx$$

Optimal (type 4, 153 leaves, 9 steps):

$$-\frac{\text{Cos}\left[a-\frac{b c}{d}\right]\text{CosIntegral}\left[\frac{c (b-d)}{d}+(b-d)\,x\right]}{2\,b}+\frac{\text{Cos}\left[a-\frac{b c}{d}\right]\text{CosIntegral}\left[\frac{c (b+d)}{d}+(b+d)\,x\right]}{2\,b}+$$
$$\frac{\text{Sin}\left[a-\frac{b c}{d}\right]\text{SinIntegral}\left[\frac{c (b-d)}{d}+(b-d)\,x\right]}{2\,b}+\frac{\text{Sin}[a+b\,x]\,\text{SinIntegral}[c+d\,x]}{b}-\frac{\text{Sin}\left[a-\frac{b c}{d}\right]\text{SinIntegral}\left[\frac{c (b+d)}{d}+(b+d)\,x\right]}{2\,b}$$

Result (type 4, 164 leaves):

$$\frac{1}{4\,b}e^{-\frac{i\,(b\,c+a\,d)}{d}}\left(-e^{\frac{2\,i\,b\,c}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b-d)\,(c+d\,x)}{d}\right]-e^{2\,i\,a}\,\text{ExpIntegralEi}\left[\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+\right.$$
$$\left.e^{\frac{2\,i\,b\,c}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b+d)\,(c+d\,x)}{d}\right]+e^{2\,i\,a}\,\text{ExpIntegralEi}\left[\frac{i\,(b+d)\,(c+d\,x)}{d}\right]+4\,e^{\frac{i\,(b\,c+a\,d)}{d}}\,\text{Sin}[a+b\,x]\,\text{SinIntegral}[c+d\,x]\right)$$

Problem 108: Unable to integrate problem.

$$\int \frac{\text{CosIntegral}[b x] \, \text{Sin}[b x]}{x^2} \, dx$$

Optimal (type 4, 44 leaves, 7 steps):

$$\frac{1}{2} b \, \text{CosIntegral}[b x]^2 + b \, \text{CosIntegral}[2 b x] - \frac{\text{CosIntegral}[b x] \, \text{Sin}[b x]}{x} - \frac{\text{Sin}[2 b x]}{2 x}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{CosIntegral}[b x] \, \text{Sin}[b x]}{x^2} \, dx$$

Problem 114: Unable to integrate problem.

$$\int \frac{\text{Cos}[b x] \, \text{CosIntegral}[b x]}{x^3} \, dx$$

Optimal (type 4, 97 leaves, 14 steps):

$$-\frac{\text{Cos}[b x]^2}{4 x^2} - \frac{\text{Cos}[b x] \, \text{CosIntegral}[b x]}{2 x^2} - \frac{1}{4} b^2 \, \text{CosIntegral}[b x]^2 - b^2 \, \text{CosIntegral}[2 b x] + \frac{b \, \text{Cos}[b x] \, \text{Sin}[b x]}{2 x} + \frac{b \, \text{CosIntegral}[b x] \, \text{Sin}[b x]}{2 x} + \frac{b \, \text{Sin}[2 b x]}{4 x}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{Cos}[b x] \, \text{CosIntegral}[b x]}{x^3} \, dx$$

Problem 131: Result unnecessarily involves imaginary or complex numbers.

$$\int x \, \text{CosIntegral}[c + d x] \, \text{Sin}[a + b x] \, dx$$

Optimal (type 4, 371 leaves, 24 steps):

$$-\frac{c\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}-\frac{x\,\text{Cos}[a+b\,x]\,\text{CosIntegral}[c+d\,x]}{b}-\frac{c\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}-\frac{\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]\,\text{Sin}\left[a-\frac{b\,c}{d}\right]}{2\,b^2}-\frac{\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]\,\text{Sin}\left[a-\frac{b\,c}{d}\right]}{2\,b^2}+\frac{\text{CosIntegral}[c+d\,x]\,\text{Sin}[a+b\,x]}{b^2}+\frac{\text{Sin}[a-c+(b-d)\,x]}{2\,b\,(b-d)}+\frac{\text{Sin}[a+c+(b+d)\,x]}{2\,b\,(b+d)}-\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}+\frac{c\,\text{Sin}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}-\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}+\frac{c\,\text{Sin}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}$$

Result (type 4, 332 leaves):

$$-\frac{1}{4\,b^2\,d}e^{-i\,(a+c)}\left(-i\,b\,d\left(\frac{e^{-i\,(b+d)\,x}}{b+d}+\frac{e^{i\,(2\,c-b\,x+d\,x)}}{b-d}\right)+(b\,c+i\,d)\,e^{\frac{i\,c\,(b+d)}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+(b\,c+i\,d)\,e^{\frac{i\,c\,(b+d)}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)-\frac{1}{4\,b^2\,d}e^{i\,(a-c)}\left(i\,b\,d\left(\frac{e^{i\,(b-d)\,x}}{b-d}+\frac{e^{i\,(2\,c+(b+d)\,x)}}{b+d}\right)+(b\,c-i\,d)\,e^{-\frac{i\,c\,(b-d)}{d}}\,\text{ExpIntegralEi}\left[\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+(b\,c-i\,d)\,e^{-\frac{i\,c\,(b-d)}{d}}\,\text{ExpIntegralEi}\left[\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)-\frac{\text{CosIntegral}[c+d\,x]\,(b\,x\,\text{Cos}[a+b\,x]-\text{Sin}[a+b\,x])}{b^2}$$

Problem 132: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{CosIntegral}[c+d\,x]\,\text{Sin}[a+b\,x]\,dx$$

Optimal (type 4, 154 leaves, 9 steps):

$$\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b}-\frac{\text{Cos}[a+b\,x]\,\text{CosIntegral}[c+d\,x]}{b}+\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b}-\frac{\text{Sin}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b}-\frac{\text{Sin}\left[a-\frac{b\,c}{d}\right]\,\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b}$$

Result (type 4, 144 leaves):

$$\frac{1}{4b}\Bigg(-4\,\text{Cos}[a+b\,x]\,\text{CosIntegral}[c+d\,x]+\left(\text{ExpIntegralEi}\left[-\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+\text{ExpIntegralEi}\left[-\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)\left(\text{Cos}\left[a-\frac{b\,c}{d}\right]-i\,\text{Sin}\left[a-\frac{b\,c}{d}\right]\right)+\left(\text{ExpIntegralEi}\left[\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+\text{ExpIntegralEi}\left[\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)\left(\text{Cos}\left[a-\frac{b\,c}{d}\right]+i\,\text{Sin}\left[a-\frac{b\,c}{d}\right]\right)\Bigg)$$

Problem 134: Result unnecessarily involves imaginary or complex numbers.

$$\int x\,\text{Cos}[a+b\,x]\,\text{CosIntegral}[c+d\,x]\,dx$$

Optimal (type 4, 370 leaves, 24 steps):

$$\frac{\text{Cos}[a-c+(b-d)\,x]}{2\,b\,(b-d)}+\frac{\text{Cos}[a+c+(b+d)\,x]}{2\,b\,(b+d)}-\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}+\frac{\text{Cos}[a+b\,x]\,\text{CosIntegral}[c+d\,x]}{b^2}-\frac{\text{Cos}\left[a-\frac{b\,c}{d}\right]\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}+\frac{c\,\text{CosIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]\text{Sin}\left[a-\frac{b\,c}{d}\right]}{2\,b\,d}+\frac{c\,\text{CosIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]\text{Sin}\left[a-\frac{b\,c}{d}\right]}{2\,b\,d}+\frac{x\,\text{CosIntegral}[c+d\,x]\,\text{Sin}[a+b\,x]}{b}+\frac{c\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}+\frac{\text{Sin}\left[a-\frac{b\,c}{d}\right]\text{SinIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}+\frac{c\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}+\frac{\text{Sin}\left[a-\frac{b\,c}{d}\right]\text{SinIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}$$

Result (type 4, 347 leaves):

$$\frac{1}{4\,b^2\,d}\,i\,e^{-i\,(a+c)}\left(-i\,b\,d\left(\frac{e^{-i\,(b+d)\,x}}{b+d}+\frac{e^{i\,(2\,a+(b-d)\,x)}}{b-d}\right)+(-b\,c+i\,d)\,e^{\frac{i\,(-b\,c+(2\,a+c)\,d)}{d}}\,\text{ExpIntegralEi}\left[\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+(b\,c+i\,d)\,e^{\frac{i\,c\,(b+d)}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)+\frac{1}{4\,b^2\,d}\,i\,e^{-i\,(a-c)}\left(-i\,b\,d\left(\frac{e^{-i\,(b-d)\,x}}{b-d}+\frac{e^{i\,(2\,a+(b+d)\,x)}}{b+d}\right)+(b\,c+i\,d)\,e^{\frac{i\,c\,(b-d)}{d}}\,\text{ExpIntegralEi}\left[-\frac{i\,(b-d)\,(c+d\,x)}{d}\right]+(-b\,c+i\,d)\,e^{2\,i\,a-\frac{i\,c\,(b+d)}{d}}\,\text{ExpIntegralEi}\left[\frac{i\,(b+d)\,(c+d\,x)}{d}\right]\right)+\frac{\text{CosIntegral}[c+d\,x]\,(\text{Cos}[a+b\,x]+b\,x\,\text{Sin}[a+b\,x])}{b^2}$$

Problem 135: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Cos}[a+b\,x]\,\text{CosIntegral}[c+d\,x]\,dx$$

Optimal (type 4, 153 leaves, 9 steps):

$$-\frac{\text{CosIntegral}\left[\frac{c(b-d)}{d}+(b-d)x\right]\text{Sin}\left[a-\frac{bc}{d}\right]}{2b}-\frac{\text{CosIntegral}\left[\frac{c(b+d)}{d}+(b+d)x\right]\text{Sin}\left[a-\frac{bc}{d}\right]}{2b}+\frac{\text{CosIntegral}[c+dx]\,\text{Sin}[a+bx]}{b}-\frac{\text{Cos}\left[a-\frac{bc}{d}\right]\text{SinIntegral}\left[\frac{c(b-d)}{d}+(b-d)x\right]}{2b}-\frac{\text{Cos}\left[a-\frac{bc}{d}\right]\text{SinIntegral}\left[\frac{c(b+d)}{d}+(b+d)x\right]}{2b}$$

Result (type 4, 153 leaves):

$$\frac{1}{4b}\left(i\,e^{-\frac{i(bc+ad)}{d}}\left(-e^{\frac{2ibc}{d}}\text{ExpIntegralEi}\left[-\frac{i(b-d)(c+dx)}{d}\right]+e^{2ia}\text{ExpIntegralEi}\left[\frac{i(b-d)(c+dx)}{d}\right]-e^{\frac{2ibc}{d}}\text{ExpIntegralEi}\left[-\frac{i(b+d)(c+dx)}{d}\right]+e^{2ia}\text{ExpIntegralEi}\left[\frac{i(b+d)(c+dx)}{d}\right]\right)+4\,\text{CosIntegral}[c+dx]\,\text{Sin}[a+bx]\right)$$

Test results for the 136 problems in "8.5 Hyperbolic integral functions.m"

Problem 6: Unable to integrate problem.

$$\int\frac{\text{SinhIntegral}[bx]}{x}\,dx$$

Optimal (type 5, 38 leaves, 1 step):

$$\frac{1}{2}bx\,\text{HypergeometricPFQ}[\{1,1,1\},\{2,2,2\},-bx]+\frac{1}{2}bx\,\text{HypergeometricPFQ}[\{1,1,1\},\{2,2,2\},bx]$$

Result (type 8, 10 leaves):

$$\int\frac{\text{SinhIntegral}[bx]}{x}\,dx$$

Problem 39: Unable to integrate problem.

$$\int\frac{\text{Sinh}[bx]\,\text{SinhIntegral}[bx]}{x^3}\,dx$$

Optimal (type 4, 96 leaves, 14 steps):

$$b^2\,\text{CoshIntegral}[2bx]-\frac{b\,\text{Cosh}[bx]\,\text{Sinh}[bx]}{2x}-\frac{\text{Sinh}[bx]^2}{4x^2}-\frac{b\,\text{Sinh}[2bx]}{4x}-\frac{b\,\text{Cosh}[bx]\,\text{SinhIntegral}[bx]}{2x}-\frac{\text{Sinh}[bx]\,\text{SinhIntegral}[bx]}{2x^2}+\frac{1}{4}b^2\,\text{SinhIntegral}[bx]^2$$

Result (type 8, 14 leaves):

$$\int \frac{\text{Sinh}[b\,x]\ \text{SinhIntegral}[b\,x]}{x^3}\,dx$$

Problem 47: Unable to integrate problem.

$$\int \frac{\text{Cosh}[b\,x]\ \text{SinhIntegral}[b\,x]}{x^2}\,dx$$

Optimal (type 4, 44 leaves, 7 steps):

$$b\,\text{CoshIntegral}[2\,b\,x]-\frac{\text{Sinh}[2\,b\,x]}{2\,x}-\frac{\text{Cosh}[b\,x]\ \text{SinhIntegral}[b\,x]}{x}+\frac{1}{2}\,b\,\text{SinhIntegral}[b\,x]^2$$

Result (type 8, 14 leaves):

$$\int \frac{\text{Cosh}[b\,x]\ \text{SinhIntegral}[b\,x]}{x^2}\,dx$$

Problem 63: Result more than twice size of optimal antiderivative.

$$\int x\,\text{Sinh}[a+b\,x]\ \text{SinhIntegral}[c+d\,x]\,dx$$

Optimal (type 4, 371 leaves, 24 steps):

$$\frac{\text{Cosh}\left[a-c+(b-d)\,x\right]}{2\,b\,(b-d)}-\frac{\text{Cosh}\left[a+c+(b+d)\,x\right]}{2\,b\,(b+d)}-\frac{\text{Cosh}\left[a-\frac{b\,c}{d}\right]\ \text{CoshIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}+\frac{\text{Cosh}\left[a-\frac{b\,c}{d}\right]\ \text{CoshIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}-$$
$$\frac{c\,\text{CoshIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]\ \text{Sinh}\left[a-\frac{b\,c}{d}\right]}{2\,b\,d}+\frac{c\,\text{CoshIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]\ \text{Sinh}\left[a-\frac{b\,c}{d}\right]}{2\,b\,d}-$$
$$\frac{c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\ \text{SinhIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}-\frac{\text{Sinh}\left[a-\frac{b\,c}{d}\right]\ \text{SinhIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}+\frac{x\,\text{Cosh}[a+b\,x]\ \text{SinhIntegral}[c+d\,x]}{b}-$$
$$\frac{\text{Sinh}[a+b\,x]\ \text{SinhIntegral}[c+d\,x]}{b^2}+\frac{c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\ \text{SinhIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}+\frac{\text{Sinh}\left[a-\frac{b\,c}{d}\right]\ \text{SinhIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}$$

Result (type 4, 887 leaves):

$$\frac{1}{4 b^2 (b-d) d (b+d)}\Bigg(2 b^2 d \operatorname{Cosh}[a-c+b x-d x]+2 b d^2 \operatorname{Cosh}[a-c+b x-d x]-2 b^2 d \operatorname{Cosh}[a+c+(b+d) x]+$$
$$2 b d^2 \operatorname{Cosh}[a+c+(b+d) x]-2 (b^2-d^2) \operatorname{CoshIntegral}\left[-\frac{(b-d) (c+d x)}{d}\right]\left(d \operatorname{Cosh}\left[a-\frac{b c}{d}\right]+b c \operatorname{Sinh}\left[a-\frac{b c}{d}\right]\right)+$$
$$2 (b^2-d^2) \operatorname{CoshIntegral}\left[\frac{(b+d) (c+d x)}{d}\right]\left(d \operatorname{Cosh}\left[a-\frac{b c}{d}\right]+b c \operatorname{Sinh}\left[a-\frac{b c}{d}\right]\right)+4 b^3 d x \operatorname{Cosh}[a+b x] \operatorname{SinhIntegral}[c+d x]-$$
$$4 b d^3 x \operatorname{Cosh}[a+b x] \operatorname{SinhIntegral}[c+d x]-4 b^2 d \operatorname{Sinh}[a+b x] \operatorname{SinhIntegral}[c+d x]+4 d^3 \operatorname{Sinh}[a+b x] \operatorname{SinhIntegral}[c+d x]-$$
$$b^3 c \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]-b^2 d \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]+$$
$$b c d^2 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]+d^3 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]-$$
$$b^3 c \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]-b^2 d \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]+$$
$$b c d^2 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]+d^3 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right]+$$
$$2 b^3 c \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right]-2 b c d^2 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right]+$$
$$2 b^2 d \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right]-2 d^3 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right]+$$
$$b^3 c \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]-b^2 d \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]-$$
$$b c d^2 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]+d^3 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]-$$
$$b^3 c \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]+b^2 d \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]+$$
$$b c d^2 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]-d^3 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right]\Bigg)$$

Problem 66: Result more than twice size of optimal antiderivative.

$$\int x \operatorname{Cosh}[a+b x] \operatorname{SinhIntegral}[c+d x] \, dx$$

Optimal (type 4, 371 leaves, 24 steps):

$$-\frac{c\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\,\mathrm{CoshIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}+\frac{c\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\,\mathrm{CoshIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}-$$
$$\frac{\mathrm{CoshIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]}{2\,b^2}+\frac{\mathrm{CoshIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]}{2\,b^2}+\frac{\mathrm{Sinh}\left[a-c+(b-d)\,x\right]}{2\,b\,(b-d)}-\frac{\mathrm{Sinh}\left[a+c+(b+d)\,x\right]}{2\,b\,(b+d)}-$$
$$\frac{\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\,\mathrm{SinhIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}-\frac{c\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\,\mathrm{SinhIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}-\frac{\mathrm{Cosh}[a+b\,x]\,\mathrm{SinhIntegral}[c+d\,x]}{b^2}+$$
$$\frac{x\,\mathrm{Sinh}[a+b\,x]\,\mathrm{SinhIntegral}[c+d\,x]}{b}+\frac{\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\,\mathrm{SinhIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}+\frac{c\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\,\mathrm{SinhIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}$$

Result (type 4, 887 leaves):

$$\frac{1}{4\,b^2\,(b-d)\,d\,(b+d)}\left(-2\,(b^2-d^2)\,\mathrm{CoshIntegral}\left[-\frac{(b-d)\,(c+d\,x)}{d}\right]\left(b\,c\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]+d\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\right)+\right.$$
$$2\,(b^2-d^2)\,\mathrm{CoshIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]\left(b\,c\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]+d\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\right)+2\,b^2\,d\,\mathrm{Sinh}[a-c+b\,x-d\,x]+$$
$$2\,b\,d^2\,\mathrm{Sinh}[a-c+b\,x-d\,x]-2\,b^2\,d\,\mathrm{Sinh}[a+c+(b+d)\,x]+2\,b\,d^2\,\mathrm{Sinh}[a+c+(b+d)\,x]-4\,b^2\,d\,\mathrm{Cosh}[a+b\,x]\,\mathrm{SinhIntegral}[c+d\,x]+$$
$$4\,d^3\,\mathrm{Cosh}[a+b\,x]\,\mathrm{SinhIntegral}[c+d\,x]+4\,b^3\,d\,x\,\mathrm{Sinh}[a+b\,x]\,\mathrm{SinhIntegral}[c+d\,x]-4\,b\,d^3\,x\,\mathrm{Sinh}[a+b\,x]\,\mathrm{SinhIntegral}[c+d\,x]-$$
$$b^3\,c\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-b^2\,d\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+$$
$$b\,c\,d^2\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+d^3\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-$$
$$b^3\,c\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-b^2\,d\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+$$
$$b\,c\,d^2\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+d^3\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+$$
$$2\,b^2\,d\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]-2\,d^3\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]+$$
$$2\,b^3\,c\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]-2\,b\,c\,d^2\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]-$$
$$b^3\,c\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+b^2\,d\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+$$
$$b\,c\,d^2\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-d^3\,\mathrm{Cosh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+$$
$$b^3\,c\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-b^2\,d\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-$$
$$\left.b\,c\,d^2\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+d^3\,\mathrm{Sinh}\left[a-\frac{b\,c}{d}\right]\mathrm{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]\right)$$

Problem 74: Unable to integrate problem.

$$\int \frac{\text{CoshIntegral}[b\,x]}{x}\,dx$$

Optimal (type 5, 52 leaves, 1 step):

$$-\frac{1}{2} b\,x\,\text{HypergeometricPFQ}[\{1,1,1\},\{2,2,2\},-b\,x]+\frac{1}{2} b\,x\,\text{HypergeometricPFQ}[\{1,1,1\},\{2,2,2\},b\,x]+\text{EulerGamma}\,\text{Log}[x]+\frac{1}{2}\text{Log}[b\,x]^2$$

Result (type 8, 10 leaves):

$$\int \frac{\text{CoshIntegral}[b\,x]}{x}\,dx$$

Problem 107: Unable to integrate problem.

$$\int \frac{\text{Cosh}[b\,x]\,\text{CoshIntegral}[b\,x]}{x^3}\,dx$$

Optimal (type 4, 96 leaves, 14 steps):

$$-\frac{\text{Cosh}[b\,x]^2}{4\,x^2}-\frac{\text{Cosh}[b\,x]\,\text{CoshIntegral}[b\,x]}{2\,x^2}+\frac{1}{4} b^2\,\text{CoshIntegral}[b\,x]^2+ b^2\,\text{CoshIntegral}[2\,b\,x]-\frac{b\,\text{Cosh}[b\,x]\,\text{Sinh}[b\,x]}{2\,x}-\frac{b\,\text{CoshIntegral}[b\,x]\,\text{Sinh}[b\,x]}{2\,x}-\frac{b\,\text{Sinh}[2\,b\,x]}{4\,x}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{Cosh}[b\,x]\,\text{CoshIntegral}[b\,x]}{x^3}\,dx$$

Problem 115: Unable to integrate problem.

$$\int \frac{\text{CoshIntegral}[b\,x]\,\text{Sinh}[b\,x]}{x^2}\,dx$$

Optimal (type 4, 44 leaves, 7 steps):

$$\frac{1}{2} b\,\text{CoshIntegral}[b\,x]^2+b\,\text{CoshIntegral}[2\,b\,x]-\frac{\text{CoshIntegral}[b\,x]\,\text{Sinh}[b\,x]}{x}-\frac{\text{Sinh}[2\,b\,x]}{2\,x}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{CoshIntegral}[b\,x]\,\text{Sinh}[b\,x]}{x^2}\,dx$$

Problem 131: Result more than twice size of optimal antiderivative.

$$\int x\,\text{CoshIntegral}[c+d\,x]\,\text{Sinh}[a+b\,x]\,dx$$

Optimal (type 4, 371 leaves, 24 steps):

$$\frac{c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{CoshIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}+\frac{x\,\text{Cosh}[a+b\,x]\,\text{CoshIntegral}[c+d\,x]}{b}+\frac{c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{CoshIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}+\frac{\text{CoshIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]}{2\,b^2}+\frac{\text{CoshIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]}{2\,b^2}-\frac{\text{CoshIntegral}[c+d\,x]\,\text{Sinh}[a+b\,x]}{b^2}-\frac{\text{Sinh}[a-c+(b-d)\,x]}{2\,b\,(b-d)}-\frac{\text{Sinh}[a+c+(b+d)\,x]}{2\,b\,(b+d)}+\frac{\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b^2}+\frac{c\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{c\,(b-d)}{d}+(b-d)\,x\right]}{2\,b\,d}+\frac{\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b^2}+\frac{c\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{c\,(b+d)}{d}+(b+d)\,x\right]}{2\,b\,d}$$

Result (type 4, 916 leaves):

$$\frac{1}{4\,b^2\,(b-d)\,d\,(b+d)}\left(2\,b^3\,c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{CoshIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]-\right.$$
$$2\,b\,c\,d^2\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{CoshIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]+2\,b^2\,d\,\text{CoshIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]-$$
$$2\,d^3\,\text{CoshIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]+2\,(b^2-d^2)\,\text{CoshIntegral}\left[-\frac{(b-d)\,(c+d\,x)}{d}\right]\,\left(b\,c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]+d\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\right)+$$
$$4\,d\,(b^2-d^2)\,\text{CoshIntegral}[c+d\,x]\,(b\,x\,\text{Cosh}[a+b\,x]-\text{Sinh}[a+b\,x])-2\,b^2\,d\,\text{Sinh}[a-c+b\,x-d\,x]-$$
$$2\,b\,d^2\,\text{Sinh}[a-c+b\,x-d\,x]-2\,b^2\,d\,\text{Sinh}[a+c+(b+d)\,x]+2\,b\,d^2\,\text{Sinh}[a+c+(b+d)\,x]+$$
$$b^3\,c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+b^2\,d\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-$$
$$b\,c\,d^2\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-d^3\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+$$
$$b^3\,c\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+b^2\,d\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-$$
$$b\,c\,d^2\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]-d^3\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b-d)\,(c+d\,x)}{d}\right]+$$
$$2\,b^2\,d\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]-2\,d^3\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]+$$
$$2\,b^3\,c\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]-2\,b\,c\,d^2\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[\frac{(b+d)\,(c+d\,x)}{d}\right]+$$
$$b^3\,c\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-b^2\,d\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-$$
$$b\,c\,d^2\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+d^3\,\text{Cosh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-$$
$$b^3\,c\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+b^2\,d\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]+$$
$$\left.b\,c\,d^2\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]-d^3\,\text{Sinh}\left[a-\frac{b\,c}{d}\right]\,\text{SinhIntegral}\left[c-\frac{b\,c}{d}-b\,x+d\,x\right]\right)$$

Problem 134: Result more than twice size of optimal antiderivative.

$$\int x\,\text{Cosh}[a+b\,x]\,\text{CoshIntegral}[c+d\,x]\,dx$$

Optimal (type 4, 371 leaves, 24 steps):

$$-\frac{\text{Cosh}\left[a-c+\left(b-d\right)x\right]}{2b\left(b-d\right)}-\frac{\text{Cosh}\left[a+c+\left(b+d\right)x\right]}{2b\left(b+d\right)}+\frac{\text{Cosh}\left[a-\frac{bc}{d}\right]\text{CoshIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)x\right]}{2b^2}-$$

$$\frac{\text{Cosh}[a+bx]\,\text{CoshIntegral}[c+dx]}{b^2}+\frac{\text{Cosh}\left[a-\frac{bc}{d}\right]\text{CoshIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)x\right]}{2b^2}+\frac{c\,\text{CoshIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)x\right]\text{Sinh}\left[a-\frac{bc}{d}\right]}{2bd}+$$

$$\frac{c\,\text{CoshIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)x\right]\text{Sinh}\left[a-\frac{bc}{d}\right]}{2bd}+\frac{x\,\text{CoshIntegral}[c+dx]\,\text{Sinh}[a+bx]}{b}+\frac{c\,\text{Cosh}\left[a-\frac{bc}{d}\right]\text{SinhIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)x\right]}{2bd}+$$

$$\frac{\text{Sinh}\left[a-\frac{bc}{d}\right]\text{SinhIntegral}\left[\frac{c\,(b-d)}{d}+\left(b-d\right)x\right]}{2b^2}+\frac{c\,\text{Cosh}\left[a-\frac{bc}{d}\right]\text{SinhIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)x\right]}{2bd}+\frac{\text{Sinh}\left[a-\frac{bc}{d}\right]\text{SinhIntegral}\left[\frac{c\,(b+d)}{d}+\left(b+d\right)x\right]}{2b^2}$$

Result (type 4, 916 leaves) :

$$\frac{1}{4 b^2 (b-d) d (b+d)} \Big(-2 b^2 d \operatorname{Cosh}[a-c+b x-d x] - 2 b d^2 \operatorname{Cosh}[a-c+b x-d x] -$$

$$2 b^2 d \operatorname{Cosh}[a+c+(b+d) x] + 2 b d^2 \operatorname{Cosh}[a+c+(b+d) x] + 2 b^2 d \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{CoshIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] -$$

$$2 d^3 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{CoshIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] + 2 b^3 c \operatorname{CoshIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] \operatorname{Sinh}\left[a-\frac{b c}{d}\right] -$$

$$2 b c d^2 \operatorname{CoshIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] \operatorname{Sinh}\left[a-\frac{b c}{d}\right] + 2 \left(b^2-d^2\right) \operatorname{CoshIntegral}\left[-\frac{(b-d) (c+d x)}{d}\right] \left(d \operatorname{Cosh}\left[a-\frac{b c}{d}\right] + b c \operatorname{Sinh}\left[a-\frac{b c}{d}\right]\right) +$$

$$4 d \left(b^2-d^2\right) \operatorname{CoshIntegral}[c+d x] \left(-\operatorname{Cosh}[a+b x] + b x \operatorname{Sinh}[a+b x]\right) +$$

$$b^3 c \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] + b^2 d \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] -$$

$$b c d^2 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] - d^3 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] +$$

$$b^3 c \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] + b^2 d \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] -$$

$$b c d^2 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] - d^3 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b-d) (c+d x)}{d}\right] +$$

$$2 b^3 c \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] - 2 b c d^2 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] +$$

$$2 b^2 d \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] - 2 d^3 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[\frac{(b+d) (c+d x)}{d}\right] -$$

$$b^3 c \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] + b^2 d \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] +$$

$$b c d^2 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] - d^3 \operatorname{Cosh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] +$$

$$b^3 c \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] - b^2 d \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] -$$

$$b c d^2 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] + d^3 \operatorname{Sinh}\left[a-\frac{b c}{d}\right] \operatorname{SinhIntegral}\left[c-\frac{b c}{d}-b x+d x\right] \Big)$$

Test results for the 233 problems in "8.6 Gamma functions.m"

Problem 1: Result more than twice size of optimal antiderivative.

$$\int x^{100} \operatorname{Gamma}[0, a x] \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{101} x^{101} \text{Gamma}[0, a x] - \frac{\text{Gamma}[101, a x]}{101 a^{101}}$$

Result (type 4, 828 leaves):

$$\frac{1}{101 a^{101}} e^{-a x}$$

(-93 326 215 443 944 152 681 699 238 856 266 700 490 715 968 264 381 621 468 592 963 895 217 599 993 229 915 608 941 463 976 156 518 286 253 697 920 827 223 758 251 185 210 916 864 000 000 000 000 000 000 000 000 -

93 326 215 443 944 152 681 699 238 856 266 700 490 715 968 264 381 621 468 592 963 895 217 599 993 229 915 608 941 463 976 156 518 286 253 697 920 827 223 758 251 185 210 916 864 000 000 000 000 000 000 000 000 $a x$ -

46 663 107 721 972 076 340 849 619 428 133 350 245 357 984 132 190 810 734 296 481 947 608 799 996 614 957 804 470 731 988 078 259 143 126 848 960 413 611 879 125 592 605 458 432 000 000 000 000 000 000 000 000 $a^{2} x^{2}$ -

15 554 369 240 657 358 780 283 206 476 044 450 081 785 994 710 730 270 244 765 493 982 536 266 665 538 319 268 156 910 662 692 753 047 708 949 653 471 203 959 708 530 868 486 144 000 000 000 000 000 000 000 000 $a^{3} x^{3}$ -

3 888 592 310 164 339 695 070 801 619 011 112 520 446 498 677 682 567 561 191 373 495 634 066 666 384 579 817 039 227 665 673 188 261 927 237 413 367 800 989 927 132 717 121 536 000 000 000 000 000 000 000 000 $a^{4} x^{4}$ -

777 718 462 032 867 939 014 160 323 802 222 504 089 299 735 536 513 512 238 274 699 126 813 333 276 915 963 407 845 533 134 637 652 385 447 482 673 560 197 985 426 543 424 307 200 000 000 000 000 000 000 000 $a^{5} x^{5}$ -

129 619 743 672 144 656 502 360 053 967 037 084 014 883 289 256 085 585 373 045 783 187 802 222 212 819 327 234 640 922 189 106 275 397 574 580 445 593 366 330 904 423 904 051 200 000 000 000 000 000 000 000 $a^{6} x^{6}$ -

18 517 106 238 877 808 071 765 721 995 291 012 002 126 184 179 440 797 910 435 111 883 971 746 030 402 761 033 520 131 741 300 896 485 367 797 206 513 338 047 272 060 557 721 600 000 000 000 000 000 000 000 $a^{7} x^{7}$ -

2 314 638 279 859 726 008 970 715 249 411 376 500 265 773 022 430 099 738 804 388 985 496 468 253 800 345 129 190 016 467 662 612 060 670 974 650 814 167 255 909 007 569 715 200 000 000 000 000 000 000 000 $a^{8} x^{8}$ -

257 182 031 095 525 112 107 857 249 934 597 388 918 419 224 714 455 526 533 820 998 388 496 472 644 482 792 132 224 051 962 512 451 185 663 850 090 463 028 434 334 174 412 800 000 000 000 000 000 000 000 $a^{9} x^{9}$ -

25 718 203 109 552 511 210 785 724 993 459 738 891 841 922 471 445 552 653 382 099 838 849 647 264 448 279 213 222 405 196 251 245 118 566 385 009 046 302 843 433 417 441 280 000 000 000 000 000 000 000 $a^{10} x^{10}$ -

2 338 018 464 504 773 746 435 065 908 496 339 899 258 356 588 313 232 059 398 372 712 622 695 205 858 934 473 929 309 563 295 567 738 051 489 546 276 936 622 130 310 676 480 000 000 000 000 000 000 000 $a^{11} x^{11}$ -

194 834 872 042 064 478 869 588 825 708 028 324 938 196 382 359 436 004 949 864 392 718 557 933 821 577 872 827 442 463 607 963 978 170 957 462 189 744 718 510 859 223 040 000 000 000 000 000 000 000 $a^{12} x^{12}$ -

14 987 297 849 389 575 297 660 678 900 617 563 456 784 337 104 572 000 380 758 799 439 889 071 832 429 067 140 572 497 200 612 613 705 458 266 322 288 055 270 066 094 080 000 000 000 000 000 000 000 $a^{13} x^{13}$ -

1 070 521 274 956 398 235 547 191 350 044 111 675 484 595 507 469 428 598 625 628 531 420 647 988 030 647 652 898 035 514 329 472 407 532 733 308 734 861 090 719 006 720 000 000 000 000 000 000 000 $a^{14} x^{14}$ -

71 368 084 997 093 215 703 146 090 002 940 778 365 639 700 497 961 906 575 041 902 094 709 865 868 709 843 526 535 700 955 298 160 502 182 220 582 324 072 714 600 448 000 000 000 000 000 000 000 $a^{15} x^{15}$ -

4 460 505 312 318 325 981 446 630 625 183 798 647 852 481 281 122 619 160 940 118 880 919 366 616 794 365 220 408 481 309 706 135 031 386 388 786 395 254 544 662 528 000 000 000 000 000 000 000 $a^{16} x^{16}$ -

262 382 665 430 489 763 614 507 683 834 341 096 932 498 898 889 565 832 996 477 581 230 550 977 458 492 071 788 734 194 688 596 178 316 846 399 199 720 855 568 384 000 000 000 000 000 000 000 $a^{17} x^{17}$ -

14 576 814 746 138 320 200 805 982 435 241 172 051 805 494 382 753 657 388 693 198 957 252 832 081 027 337 321 596 344 149 366 454 350 935 911 066 651 158 642 688 000 000 000 000 000 000 000 $a^{18} x^{18}$ –

767 200 776 112 543 168 463 472 759 749 535 371 147 657 599 092 297 757 299 642 050 381 728 004 264 596 701 136 649 692 071 918 650 049 258 477 192 166 244 352 000 000 000 000 000 000 000 $a^{19} x^{19}$ –

38 360 038 805 627 158 423 173 637 987 476 768 557 382 879 954 614 887 864 982 102 519 086 400 213 229 835 056 832 484 603 595 932 502 462 923 859 608 312 217 600 000 000 000 000 000 000 $a^{20} x^{20}$ –

1 826 668 514 553 674 210 627 316 094 641 750 883 684 899 045 457 851 803 094 385 834 242 209 533 963 325 478 896 784 981 123 615 833 450 615 421 886 110 105 600 000 000 000 000 000 000 $a^{21} x^{21}$ –

83 030 387 025 167 009 573 968 913 392 806 858 349 313 592 975 356 900 140 653 901 556 464 069 725 605 703 586 217 499 141 982 537 884 118 882 813 005 004 800 000 000 000 000 000 000 $a^{22} x^{22}$ –

3 610 016 827 181 174 329 302 996 234 469 863 406 491 895 346 754 647 832 202 343 545 933 220 422 852 421 895 052 934 745 303 588 603 657 342 731 000 217 600 000 000 000 000 000 000 $a^{23} x^{23}$ –

150 417 367 799 215 597 054 291 509 769 577 641 937 162 306 114 776 993 008 430 981 080 550 850 952 184 245 627 205 614 387 649 525 152 389 280 458 342 400 000 000 000 000 000 000 $a^{24} x^{24}$ –

6 016 694 711 968 623 882 171 660 390 783 105 677 486 492 244 591 079 720 337 239 243 222 034 038 087 369 825 088 224 575 505 981 006 095 571 218 333 696 000 000 000 000 000 000 $a^{25} x^{25}$ –

231 411 335 075 716 303 160 448 476 568 580 987 595 634 317 099 656 912 320 663 047 816 232 078 387 975 762 503 393 252 904 076 192 542 137 354 551 296 000 000 000 000 000 000 $a^{26} x^{26}$ –

8 570 790 187 989 492 709 646 239 872 910 406 947 986 456 188 876 181 937 802 335 104 304 891 792 147 250 463 088 638 996 447 266 390 449 531 650 048 000 000 000 000 000 000 $a^{27} x^{27}$ –

306 099 649 571 053 311 058 794 281 175 371 676 713 802 006 745 577 926 350 083 396 582 317 564 005 258 945 110 308 535 587 402 371 087 483 273 216 000 000 000 000 000 000 $a^{28} x^{28}$ –

10 555 160 330 036 321 070 992 906 247 426 609 541 855 241 611 916 480 218 968 392 985 597 157 379 491 687 762 424 432 261 634 564 520 258 043 904 000 000 000 000 000 000 $a^{29} x^{29}$ –

351 838 677 667 877 369 033 096 874 914 220 318 061 841 387 063 882 673 965 613 099 519 905 245 983 056 258 747 481 075 387 818 817 341 934 796 800 000 000 000 000 000 $a^{30} x^{30}$ –

11 349 634 763 479 915 130 099 899 190 781 300 582 640 044 743 996 215 289 213 325 790 964 685 354 292 137 378 951 002 431 865 123 140 062 412 800 000 000 000 000 000 $a^{31} x^{31}$ –

354 676 086 358 747 347 815 621 849 711 915 643 207 501 398 249 881 727 787 916 430 967 646 417 321 629 293 092 218 825 995 785 098 126 950 400 000 000 000 000 000 $a^{32} x^{32}$ –

10 747 760 192 689 313 570 170 359 082 179 261 915 378 830 249 996 415 993 573 225 180 837 770 221 867 554 336 127 843 211 993 487 822 028 800 000 000 000 000 000 $a^{33} x^{33}$ –

316 110 593 902 626 869 710 892 914 181 742 997 511 142 066 176 365 176 281 565 446 495 228 535 937 281 009 886 113 035 646 867 288 883 200 000 000 000 000 000 $a^{34} x^{34}$ –

9 031 731 254 360 767 706 025 511 833 764 085 643 175 487 605 039 005 036 616 155 614 149 386 741 065 171 711 031 801 018 481 922 539 520 000 000 000 000 000 $a^{35} x^{35}$ –

250 881 423 732 243 547 389 597 550 937 891 267 865 985 766 806 639 028 794 893 211 504 149 631 696 254 769 750 883 361 624 497 848 320 000 000 000 000 000
a^{36}
x^{36} –

6 780 579 019 790 366 145 664 798 673 997 061 293 675 290 994 774 027 805 267 384 094 706 746 802 601 480 263 537 388 152 013 455 360 000 000 000 000 000 $a^{37} x^{37}$ –

178 436 289 994 483 319 622 757 859 842 027 928 780 928 710 388 790 205 401 773 265 650 177 547 436 881 059 566 773 372 421 406 720 000 000 000 000 000 $a^{38} x^{38}$ –

4 575 289 487 038 033 836 480 970 765 180 203 302 075 095 138 174 107 830 814 699 119 235 321 729 150 796 399 148 035 190 292 480 000 000 000 000 000 a^{39}
x^{39} − 114 382 237 175 950 845 912 024 269 129 505 082 551 877 378 454 352 695 770 367 477 980 883 043 228 769 909 978 700 879 757 312 000 000 000 000 000
a^{40} x^{40} −
2 789 810 662 828 069 412 488 396 808 036 709 330 533 594 596 447 626 726 106 523 853 192 269 347 043 168 536 065 875 116 032 000 000 000 000 000 a^{41} x^{41} −
66 424 063 400 668 319 344 961 828 762 778 793 584 133 204 677 324 445 859 679 139 361 720 698 739 123 060 382 520 836 096 000 000 000 000 000 a^{42} x^{42} −
1 544 745 660 480 658 589 417 716 947 971 599 850 793 795 457 612 196 415 341 375 333 993 504 621 840 071 171 686 531 072 000 000 000 000 000 a^{43} x^{43} −
35 107 855 920 014 967 941 311 748 817 536 360 245 313 533 127 549 918 530 485 803 045 306 923 223 637 981 174 693 888 000 000 000 000 000 a^{44} x^{44} −
780 174 576 000 332 620 918 038 862 611 919 116 562 522 958 389 998 189 566 351 178 784 598 293 858 621 803 882 086 400 000 000 000 000 a^{45} x^{45} −
16 960 316 869 572 448 280 826 931 795 911 285 142 663 542 573 695 612 816 659 808 234 447 788 996 926 560 953 958 400 000 000 000 000 a^{46} x^{46} −
360 857 805 735 584 005 975 041 102 040 665 641 333 266 863 270 119 421 631 059 749 669 101 893 551 628 956 467 200 000 000 000 000 a^{47} x^{47} −
7 517 870 952 824 666 791 146 689 625 847 200 861 109 726 318 127 487 950 647 078 118 106 289 448 992 269 926 400 000 000 000 000 a^{48} x^{48} −
153 425 937 812 748 301 860 136 522 976 473 486 961 422 986 084 234 447 972 389 349 349 107 947 938 617 753 600 000 000 000 000 a^{49} x^{49} −
3 068 518 756 254 966 037 202 730 459 529 469 739 228 459 721 684 688 959 447 786 986 982 158 958 772 355 072 000 000 000 000 a^{50} x^{50} −
60 167 034 436 371 883 082 406 479 598 617 053 710 361 955 327 150 763 910 740 921 313 375 665 858 281 472 000 000 000 000 a^{51} x^{51} −
1 157 058 354 545 613 136 200 124 607 665 712 571 353 114 525 522 130 075 206 556 179 103 378 189 582 336 000 000 000 000 a^{52} x^{52} −
21 831 289 708 407 795 022 643 860 521 994 576 817 983 292 934 379 812 739 746 343 001 950 531 878 912 000 000 000 000 a^{53} x^{53} −
404 283 142 748 292 500 419 330 750 407 306 978 110 801 721 007 033 569 254 561 907 443 528 368 128 000 000 000 000 a^{54} x^{54} −
7 350 602 595 423 500 007 624 195 461 951 035 965 650 940 381 946 064 895 537 489 226 245 970 329 600 000 000 000 a^{55} x^{55} −
131 260 760 632 562 500 136 146 347 534 839 927 958 052 506 820 465 444 563 169 450 468 678 041 600 000 000 000 a^{56} x^{56} −
2 302 820 361 974 780 704 142 918 377 804 209 262 421 973 803 867 814 816 897 709 657 345 228 800 000 000 000 a^{57} x^{57} −
39 703 799 344 392 770 761 084 799 617 313 952 800 378 858 687 376 117 532 719 132 023 193 600 000 000 000 a^{58} x^{58} −
672 945 751 599 877 470 526 861 010 462 948 352 548 794 215 040 273 178 520 663 254 630 400 000 000 000 a^{59} x^{59} −
11 215 762 526 664 624 508 781 016 841 049 139 209 146 570 250 671 219 642 011 054 243 840 000 000 000 a^{60} x^{60} −
183 864 959 453 518 434 570 180 603 951 625 232 936 829 020 502 806 879 377 230 397 440 000 000 000 a^{61} x^{61} −
2 965 563 862 153 523 138 228 719 418 574 600 531 239 177 750 045 272 248 019 845 120 000 000 000 a^{62} x^{62} −
47 072 442 256 405 129 178 233 641 564 676 198 908 558 376 984 845 591 238 410 240 000 000 000 a^{63} x^{63} −
735 506 910 256 330 143 409 900 649 448 065 607 946 224 640 388 212 363 100 160 000 000 000 a^{64} x^{64} −
11 315 490 927 020 463 744 767 702 299 201 009 353 018 840 621 357 113 278 464 000 000 000 a^{65} x^{65} −
171 446 832 227 582 784 011 631 853 018 197 111 409 376 373 050 865 352 704 000 000 000 a^{66} x^{66} −
2 558 907 943 695 265 433 009 430 642 062 643 453 871 289 150 012 915 712 000 000 000 a^{67} x^{67} −
37 630 999 171 989 197 544 256 332 971 509 462 556 930 722 794 307 584 000 000 000 a^{68} x^{68} −
545 376 799 594 046 341 221 106 274 949 412 500 825 082 939 047 936 000 000 000 a^{69} x^{69} −
7 791 097 137 057 804 874 587 232 499 277 321 440 358 327 700 684 800 000 000 a^{70} x^{70} −
109 733 762 493 771 899 642 073 697 172 920 020 286 737 009 868 800 000 000 a^{71} x^{71} −
1 524 080 034 635 720 828 362 134 682 957 222 503 982 458 470 400 000 000 a^{72} x^{72} −
20 877 808 693 640 011 347 426 502 506 263 321 972 362 444 800 000 000 a^{73} x^{73} −
282 132 549 914 054 207 397 655 439 273 828 675 302 195 200 000 000 a^{74} x^{74} − 3 761 767 332 187 389 431 968 739 190 317 715 670 695 936 000 000 a^{75} x^{75} −
49 496 938 581 413 018 841 693 936 714 706 785 140 736 000 000 a^{76} x^{76} − 642 817 384 174 195 049 892 129 048 242 945 261 568 000 000 a^{77} x^{77} −
8 241 248 515 053 782 690 924 731 387 730 067 456 000 000 a^{78} x^{78} − 104 319 601 456 376 996 087 654 827 692 785 664 000 000 a^{79} x^{79} −
1 303 995 018 204 712 451 095 685 346 159 820 800 000 a^{80} x^{80} − 16 098 703 928 453 240 136 983 769 705 676 800 000 a^{81} x^{81} −
196 325 657 664 063 904 109 558 167 142 400 000 a^{82} x^{82} − 2 365 369 369 446 553 061 560 941 772 800 000 a^{83} x^{83} −
28 159 159 160 078 012 637 630 259 200 000 a^{84} x^{84} − 331 284 225 412 682 501 619 179 520 000 a^{85} x^{85} − 3 852 142 155 961 424 437 432 320 000 a^{86} x^{86} −
44 277 496 045 533 614 223 360 000 a^{87} x^{87} − 503 153 364 153 791 070 720 000 a^{88} x^{88} − 5 653 408 585 997 652 480 000 a^{89} x^{89} −
62 815 650 955 529 472 000 a^{90} x^{90} − 690 281 878 632 192 000 a^{91} x^{91} − 7 503 063 898 176 000 a^{92} x^{92} − 80 678 106 432 000 a^{93} x^{93} −

Problem 5: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[0, a x]}{x} \, dx$$

Optimal (type 5, 32 leaves, 1 step):

$$a x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] - \text{EulerGamma} \, \text{Log}[x] - \frac{1}{2} \text{Log}[a x]^2$$

Result (type 5, 66 leaves):

$$a x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] + \text{Gamma}[0, a x] \, \text{Log}[a x] + \text{ExpIntegralEi}[-a x] \, (-\text{Log}[x] + \text{Log}[a x]) + \frac{1}{2} \text{Log}[x] \left(-2 \, \text{Gamma}[0, a x] + \text{Log}[x] - 2 \left(\text{EulerGamma} + \text{Log}[a x]\right)\right)$$

Problem 8: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[0, a x]}{x^4} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{3} a^3 \, \text{Gamma}[-3, a x] - \frac{\text{Gamma}[0, a x]}{3 x^3}$$

Result (type 4, 55 leaves):

$$\frac{e^{-a x} \left(2 - a x + a^2 x^2 + a^3 e^{a x} x^3 \, \text{ExpIntegralEi}[-a x] - 6 \, e^{a x} \, \text{Gamma}[0, a x]\right)}{18 x^3}$$

Problem 17: Result more than twice size of optimal antiderivative.

$$\int x^{100} \, \text{Gamma}[2, a x] \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{101} x^{101} \, \text{Gamma}[2, a x] - \frac{\text{Gamma}[103, a x]}{101 \, a^{101}}$$

Result (type 4, 839 leaves):

$$e^{-a x}$$

$$\Big(- \big(9\,519\,273\,975\,282\,303\,573\,533\,322\,363\,339\,203\,450\,053\,028\,762\,966\,925\,389\,796\,482\,317\,312\,195\,199\,309\,451\,392\,112\,029\,325\,567\,964\,865\,197\,877\,187\,924 \ldots$$

376 823 341 620 891 513 520 128 000 000 000 000 000 000 000 000 / a^{101}) $- \frac{1}{a^{100}}$

9 519 273 975 282 303 573 533 322 363 339 203 450 053 028 762 966 925 389 796 482 317 312 195 199 309 451 392 112 029 325 567 964 865 197 877 187 924
376 823 341 620 891 513 520 128 000 000 000 000 000 000 000 000 $x - \frac{1}{a^{99}}$

4 759 636 987 641 151 786 766 661 181 669 601 725 026 514 381 483 462 694 898 241 158 656 097 599 654 725 696 056 014 662 783 982 432 598 938 593 962
188 411 670 810 445 756 760 064 000 000 000 000 000 000 000 000 $x^2 - \frac{1}{a^{98}}$

1 586 545 662 547 050 595 588 887 060 556 533 908 342 171 460 494 487 564 966 080 386 218 699 199 884 908 565 352 004 887 594 660 810 866 312 864 654
062 803 890 270 148 585 586 688 000 000 000 000 000 000 000 000 $x^3 - \frac{1}{a^{97}}$

396 636 415 636 762 648 897 221 765 139 133 477 085 542 865 123 621 891 241 520 096 554 674 799 971 227 141 338 001 221 898 665 202 716 578 216 163 515
700 972 567 537 146 396 672 000 000 000 000 000 000 000 000 $x^4 - \frac{1}{a^{96}}$

79 327 283 127 352 529 779 444 353 027 826 695 417 108 573 024 724 378 248 304 019 310 934 959 994 245 428 267 600 244 379 733 040 543 315 643 232 703
140 194 513 507 429 279 334 400 000 000 000 000 000 000 000 $x^5 - \frac{1}{a^{95}}$

13 221 213 854 558 754 963 240 725 504 637 782 569 518 095 504 120 729 708 050 669 885 155 826 665 707 571 377 933 374 063 288 840 090 552 607 205 450
523 365 752 251 238 213 222 400 000 000 000 000 000 000 000 $x^6 - \frac{1}{a^{94}}$

1 888 744 836 365 536 423 320 103 643 519 683 224 216 870 786 302 961 386 864 381 412 165 118 095 101 081 625 419 053 437 612 691 441 507 515 315 064
360 480 821 750 176 887 603 200 000 000 000 000 000 000 000 $x^7 - \frac{1}{a^{93}}$

236 093 104 545 692 052 915 012 955 439 960 403 027 108 848 287 870 173 358 047 676 520 639 761 887 635 203 177 381 679 701 586 430 188 439 414 383 045
060 102 718 772 110 950 400 000 000 000 000 000 000 000 $x^8 - \frac{1}{a^{92}}$

26 232 567 171 743 561 435 001 439 493 328 933 669 678 760 920 874 463 706 449 741 835 626 640 209 737 244 797 486 853 300 176 270 020 937 712 709 227
228 900 302 085 790 105 600 000 000 000 000 000 000 000 $x^9 - \frac{1}{a^{91}}$

2 623 256 717 174 356 143 500 143 949 332 893 366 967 876 092 087 446 370 644 974 183 562 664 020 973 724 479 748 685 330 017 627 002 093 771 270 922
722 890 030 208 579 010 560 000 000 000 000 000 000 000 $x^{10} - \frac{1}{a^{90}}$

238 477 883 379 486 922 136 376 722 666 626 669 724 352 372 007 949 670 058 634 016 687 514 910 997 611 316 340 789 575 456 147 909 281 251 933 720 247
535 457 291 689 000 960 000 000 000 000 000 000 000 $x^{11} - \frac{1}{a^{89}}$

19 873 156 948 290 576 844 698 060 222 218 889 143 696 031 000 662 472 504 886 168 057 292 909 249 800 943 028 399 131 288 012 325 773 437 661 143 353
961 288 107 640 750 080 000 000 000 000 000 000 000 $x^{12} - \frac{1}{a^{88}}$

1 528 704 380 637 736 680 361 389 247 862 991 472 592 002 384 666 344 038 837 397 542 868 685 326 907 764 848 338 394 714 462 486 597 956 743 164 873
381 637 546 741 596 160 000 000 000 000 000 000 000 $x^{13} - \frac{1}{a^{87}}$

109 193 170 045 552 620 025 813 517 704 499 390 899 428 741 761 881 717 059 814 110 204 906 094 779 126 060 595 599 622 461 606 185 568 338 797 490 955 ⋱
831 253 338 685 440 000 000 000 000 000 000 000 $x^{14} - \frac{1}{a^{86}}$

7 279 544 669 703 508 001 720 901 180 299 959 393 295 249 450 792 114 470 654 274 013 660 406 318 608 404 039 706 641 497 440 412 371 222 586 499 397 ⋱
055 416 889 245 696 000 000 000 000 000 000 000 $x^{15} - \frac{1}{a^{85}}$

454 971 541 856 469 250 107 556 323 768 747 462 080 953 090 674 507 154 415 892 125 853 775 394 913 025 252 481 665 093 590 025 773 201 411 656 212 315 ⋱
963 555 577 856 000 000 000 000 000 000 000 $x^{16} - \frac{1}{a^{84}}$

26 763 031 873 909 955 888 679 783 751 102 791 887 114 887 686 735 714 965 640 713 285 516 199 700 766 191 322 450 887 858 236 810 188 318 332 718 371 ⋱
527 267 975 168 000 000 000 000 000 000 000 $x^{17} - \frac{1}{a^{83}}$

1 486 835 104 106 108 660 482 210 208 394 599 549 284 160 427 040 873 053 646 706 293 639 788 872 264 788 406 802 827 103 235 378 343 795 462 928 798 ⋱
418 181 554 176 000 000 000 000 000 000 000 $x^{18} - \frac{1}{a^{82}}$

78 254 479 163 479 403 183 274 221 494 452 607 857 061 075 107 414 371 244 563 489 138 936 256 434 988 863 515 938 268 591 335 702 305 024 364 673 600 ⋱
956 923 904 000 000 000 000 000 000 000 $x^{19} - \frac{1}{a^{81}}$

3 912 723 958 173 970 159 163 711 074 722 630 392 853 053 755 370 718 562 228 174 456 946 812 821 749 443 175 796 913 429 566 785 115 251 218 233 680 ⋱
047 846 195 200 000 000 000 000 000 000 $x^{20} - \frac{1}{a^{80}}$

186 320 188 484 474 769 483 986 241 653 458 590 135 859 702 636 700 883 915 627 355 092 705 372 464 259 198 847 472 068 074 608 815 011 962 773 032 383 ⋱
230 771 200 000 000 000 000 000 000 $x^{21} - \frac{1}{a^{79}}$

8 469 099 476 567 034 976 544 829 166 066 299 551 629 986 483 486 403 814 346 697 958 759 335 112 011 781 765 794 184 912 482 218 864 180 126 046 926 ⋱
510 489 600 000 000 000 000 000 000 $x^{22} - \frac{1}{a^{78}}$

368 221 716 372 479 781 588 905 615 915 926 067 462 173 325 368 974 078 884 639 041 685 188 483 130 947 033 295 399 344 020 966 037 573 048 958 562 022 ⋱
195 200 000 000 000 000 000 000 $x^{23} - \frac{1}{a^{77}}$

15 342 571 515 519 990 899 537 733 996 496 919 477 590 555 223 707 253 286 859 960 070 216 186 797 122 793 053 974 972 667 540 251 565 543 706 606 750 ⋱
924 800 000 000 000 000 000 000 $x^{24} - \frac{1}{a^{76}}$

613 702 860 620 799 635 981 509 359 859 876 779 103 622 208 948 290 131 474 398 402 808 647 471 884 911 722 158 998 906 701 610 062 621 748 264 270 036 ⋱
992 000 000 000 000 000 000 $x^{25} - \frac{1}{a^{75}}$

23 603 956 177 723 062 922 365 744 609 995 260 734 754 700 344 165 005 056 707 630 877 255 671 995 573 527 775 346 111 796 215 771 639 298 010 164 232 ⋱
192 000 000 000 000 000 000 $x^{26} - \frac{1}{a^{74}}$

874 220 599 174 928 256 383 916 467 036 861 508 694 618 531 265 370 557 655 838 180 639 098 962 799 019 547 235 041 177 637 621 171 825 852 228 304 896 ⋱

000 000 000 000 000 000 $x^{27} - \frac{1}{a^{73}}$

31 222 164 256 247 437 727 997 016 679 887 911 024 807 804 688 048 948 487 708 506 451 396 391 528 536 412 401 251 470 629 915 041 850 923 293 868 032 ⋱

000 000 000 000 000 000 $x^{28} - \frac{1}{a^{72}}$

1 076 626 353 663 704 749 241 276 437 237 514 173 269 234 644 415 480 982 334 776 084 530 910 052 708 152 151 767 292 090 686 725 581 066 320 478 208 ⋱

000 000 000 000 000 000 $x^{29} - \frac{1}{a^{71}}$

35 887 545 122 123 491 641 375 881 241 250 472 442 307 821 480 516 032 744 492 536 151 030 335 090 271 738 392 243 069 689 557 519 368 877 349 273 600 ⋱

000 000 000 000 000 $x^{30} - \frac{1}{a^{70}}$

1 157 662 745 874 951 343 270 189 717 459 692 659 429 284 563 887 613 959 499 759 230 678 397 906 137 798 012 653 002 248 050 242 560 286 366 105 600 ⋱

000 000 000 000 000 $x^{31} - \frac{1}{a^{69}}$

36 176 960 808 592 229 477 193 428 670 615 395 607 165 142 621 487 936 234 367 475 958 699 934 566 806 187 895 406 320 251 570 080 008 948 940 800 000 ⋱

000 000 000 000 $x^{32} - \frac{1}{a^{68}}$

1 096 271 539 654 309 984 157 376 626 382 284 715 368 640 685 499 634 431 344 468 968 445 452 562 630 490 542 285 040 007 623 335 757 846 937 600 000 ⋱

000 000 000 000 $x^{33} - \frac{1}{a^{67}}$

32 243 280 578 067 940 710 511 077 246 537 785 746 136 490 749 989 247 980 719 675 542 513 310 665 602 663 008 383 529 635 980 463 466 086 400 000 000 ⋱

000 000 000 $x^{34} - \frac{1}{a^{66}}$

921 236 587 944 798 306 014 602 207 043 936 735 603 899 735 713 978 513 734 847 872 643 237 447 588 647 514 525 243 703 885 156 099 031 040 000 000 000 ⋱

000 000 $x^{35} - \frac{1}{a^{65}}$

25 589 905 220 688 841 833 738 950 195 664 909 322 330 548 214 277 180 937 079 107 573 423 262 433 017 986 514 590 102 885 698 780 528 640 000 000 000 ⋱

000 000 $x^{36} - \frac{1}{a^{64}}$

691 619 060 018 617 346 857 809 464 747 700 251 954 879 681 466 950 836 137 273 177 660 088 173 865 350 986 880 813 591 505 372 446 720 000 000 000 000 ⋱

000 $x^{37} - \frac{1}{a^{63}}$

18 200 501 579 437 298 601 521 301 703 886 848 735 654 728 459 656 600 950 980 873 096 318 109 838 561 868 075 810 883 986 983 485 440 000 000 000 000 000

$x^{38} - \frac{1}{a^{62}}$

466 679 527 677 879 451 321 059 018 048 380 736 811 659 704 093 758 998 743 099 310 162 002 816 373 381 232 713 099 589 409 832 960 000 000 000 000 000

$x^{39} - \frac{1}{a^{61}}$

11 666 988 191 946 986 283 026 475 451 209 518 420 291 492 602 343 974 968 577 482 754 050 070 409 334 530 817 827 489 735 245 824 000 000 000 000 000

$x^{40} - \frac{1}{a^{60}}$

$$284\,560\,687\,608\,463\,080\,073\,816\,474\,419\,744\,351\,714\,426\,648\,837\,657\,926\,062\,865\,433\,025\,611\,473\,398\,403\,190\,678\,719\,261\,835\,264\,000\,000\,000\,000\,000\,x^{41} -$$

$$\frac{1}{a^{59}}6\,775\,254\,466\,868\,168\,573\,186\,106\,533\,803\,436\,945\,581\,586\,877\,087\,093\,477\,687\,272\,214\,895\,511\,271\,390\,552\,159\,017\,125\,281\,792\,000\,000\,000\,000\,000\,x^{42} -$$

$$\frac{1}{a^{58}}157\,564\,057\,369\,027\,176\,120\,607\,128\,693\,103\,184\,780\,967\,136\,676\,444\,034\,364\,820\,284\,067\,337\,471\,427\,687\,259\,512\,026\,169\,344\,000\,000\,000\,000\,000\,x^{43} -$$

$$\frac{1}{a^{57}}3\,581\,001\,303\,841\,526\,730\,013\,798\,379\,388\,708\,745\,021\,980\,379\,010\,091\,690\,109\,551\,910\,621\,306\,168\,811\,074\,079\,818\,776\,576\,000\,000\,000\,000\,000\,x^{44} -$$

$$\frac{1}{a^{56}}79\,577\,806\,752\,033\,927\,333\,639\,963\,986\,415\,749\,889\,377\,341\,755\,779\,815\,335\,767\,820\,236\,029\,025\,973\,579\,423\,995\,972\,812\,800\,000\,000\,000\,000\,x^{45} -$$

$$\frac{1}{a^{55}}1\,729\,952\,320\,696\,389\,724\,644\,347\,043\,182\,951\,084\,551\,681\,342\,516\,952\,507\,299\,300\,439\,913\,674\,477\,686\,509\,217\,303\,756\,800\,000\,000\,000\,000\,x^{46} -$$

$$\frac{1}{a^{54}}36\,807\,496\,185\,029\,568\,609\,454\,192\,408\,147\,895\,415\,993\,220\,053\,552\,181\,006\,368\,094\,466\,248\,393\,142\,266\,153\,559\,654\,400\,000\,000\,000\,000\,x^{47} -$$

$$\frac{1}{a^{53}}766\,822\,837\,188\,116\,012\,696\,962\,341\,836\,414\,487\,833\,192\,084\,449\,003\,770\,966\,001\,968\,046\,841\,523\,797\,211\,532\,492\,800\,000\,000\,000\,000\,x^{48} -$$

$$\frac{1}{a^{52}}15\,649\,445\,656\,900\,326\,789\,733\,925\,343\,600\,295\,670\,065\,144\,580\,591\,913\,693\,183\,713\,633\,609\,010\,689\,739\,010\,867\,200\,000\,000\,000\,000\,x^{49} -$$

$$\frac{1}{a^{51}}312\,988\,913\,138\,006\,535\,794\,678\,506\,872\,005\,913\,401\,302\,891\,611\,838\,273\,863\,674\,272\,672\,180\,213\,794\,780\,217\,344\,000\,000\,000\,000\,x^{50} -$$

$$\frac{1}{a^{50}}6\,137\,037\,512\,509\,932\,074\,405\,460\,919\,058\,939\,478\,456\,919\,443\,369\,377\,918\,895\,573\,973\,964\,317\,917\,544\,710\,144\,000\,000\,000\,000\,x^{51} -$$

$$\frac{1}{a^{49}}118\,019\,952\,163\,652\,539\,892\,412\,709\,981\,902\,682\,278\,017\,681\,603\,257\,267\,671\,068\,730\,268\,544\,575\,337\,398\,272\,000\,000\,000\,000\,x^{52} -$$

$$\frac{1}{a^{48}}2\,226\,791\,550\,257\,595\,092\,309\,673\,773\,243\,446\,835\,434\,295\,879\,306\,740\,899\,454\,126\,986\,198\,954\,251\,649\,024\,000\,000\,000\,000\,x^{53} -$$

$$\frac{1}{a^{47}}41\,236\,880\,560\,325\,835\,042\,771\,736\,541\,545\,311\,767\,301\,775\,542\,717\,424\,063\,965\,314\,559\,239\,893\,549\,056\,000\,000\,000\,000\,x^{54} -$$

$$\frac{1}{a^{46}}749\,761\,464\,733\,197\,000\,777\,667\,937\,119\,005\,668\,496\,395\,918\,958\,498\,619\,344\,823\,901\,077\,088\,973\,619\,200\,000\,000\,000\,x^{55} -$$

$$\frac{1}{a^{45}}13\,388\,597\,584\,521\,375\,013\,886\,927\,448\,553\,672\,651\,721\,355\,695\,687\,475\,345\,443\,283\,947\,805\,160\,243\,200\,000\,000\,000\,x^{56} -$$

$$\frac{1}{a^{44}}234\,887\,676\,921\,427\,631\,822\,577\,674\,536\,029\,344\,767\,041\,327\,994\,517\,111\,323\,566\,385\,049\,213\,337\,600\,000\,000\,000\,x^{57} -$$

$$\frac{1}{a^{43}}4\,049\,787\,533\,128\,062\,617\,630\,649\,560\,966\,023\,185\,638\,643\,586\,112\,363\,988\,337\,351\,466\,365\,747\,200\,000\,000\,000\,x^{58} -$$

$$\frac{1}{a^{42}}68\,640\,466\,663\,187\,501\,993\,739\,823\,067\,220\,731\,959\,977\,009\,934\,107\,864\,209\,107\,651\,972\,300\,800\,000\,000\,000\,x^{59} -$$

$$\frac{1\,144\,007\,777\,719\,791\,699\,895\,663\,717\,787\,012\,199\,332\,950\,165\,568\,464\,403\,485\,127\,532\,871\,680\,000\,000\,000\,x^{60}}{a^{41}} -$$

$$\frac{18\,754\,225\,864\,258\,880\,326\,158\,421\,603\,065\,773\,759\,556\,560\,091\,286\,301\,696\,477\,500\,538\,880\,000\,000\,000\,x^{61}}{a^{40}} -$$

$$\frac{302\,487\,513\,939\,659\,360\,099\,329\,380\,694\,609\,254\,186\,396\,130\,504\,617\,769\,298\,024\,202\,240\,000\,000\,000\,x^{62}}{a^{39}} -$$

$$\frac{4\,801\,389\,110\,153\,323\,176\,179\,831\,439\,596\,972\,288\,672\,954\,452\,454\,250\,306\,317\,844\,480\,000\,000\,000\,x^{63}}{a^{38}} -$$

$$\frac{75\,021\,704\,846\,145\,674\,627\,809\,866\,243\,702\,692\,010\,514\,913\,319\,597\,661\,036\,216\,320\,000\,000\,000\,x^{64}}{a^{37}} -$$

$$\frac{1\,154\,180\,074\,556\,087\,301\,966\,305\,634\,518\,502\,954\,007\,921\,743\,378\,425\,554\,403\,328\,000\,000\,000\,x^{65}}{a^{36}} -$$

$$\frac{17\,487\,576\,887\,213\,443\,969\,186\,449\,007\,856\,105\,363\,756\,390\,051\,188\,265\,975\,808\,000\,000\,000\,x^{66}}{a^{35}} -$$

$$\frac{261\,008\,610\,256\,917\,074\,166\,961\,925\,490\,389\,632\,294\,871\,493\,301\,317\,402\,624\,000\,000\,000\,x^{67}}{a^{34}} -$$

$$\frac{3\,838\,361\,915\,542\,898\,149\,514\,145\,963\,093\,965\,180\,806\,933\,725\,019\,373\,568\,000\,000\,000\,x^{68}}{a^{33}} -$$

$$\frac{55\,628\,433\,558\,592\,726\,804\,552\,840\,044\,840\,075\,084\,158\,459\,782\,889\,472\,000\,000\,000\,x^{69}}{a^{32}} -$$

$$\frac{794\,691\,907\,979\,896\,097\,207\,897\,714\,926\,286\,786\,916\,549\,425\,469\,849\,600\,000\,000\,x^{70}}{a^{31}} -$$

$$\frac{11\,192\,843\,774\,364\,733\,763\,491\,517\,111\,637\,842\,069\,247\,175\,006\,617\,600\,000\,000\,x^{71}}{a^{30}} -$$

$$\frac{155\,456\,163\,532\,843\,524\,492\,937\,737\,661\,636\,695\,406\,210\,763\,980\,800\,000\,000\,x^{72}}{a^{29}} -$$

$$\frac{2\,129\,536\,486\,751\,281\,157\,437\,503\,255\,638\,858\,841\,180\,969\,369\,600\,000\,000\,x^{73}}{a^{28}} -$$

$$\frac{28\,777\,520\,091\,233\,529\,154\,560\,854\,805\,930\,524\,880\,823\,910\,400\,000\,000\,x^{74}}{a^{27}} - \frac{383\,700\,267\,883\,113\,722\,060\,811\,397\,412\,406\,998\,410\,985\,472\,000\,000\,x^{75}}{a^{26}} -$$

$$\frac{5\,048\,687\,735\,304\,127\,921\,852\,781\,544\,900\,092\,084\,355\,072\,000\,000\,x^{76}}{a^{25}} - \frac{65\,567\,373\,185\,767\,895\,088\,997\,162\,920\,780\,416\,679\,936\,000\,000\,x^{77}}{a^{24}} -$$

$$\frac{840\,607\,348\,535\,485\,834\,474\,322\,601\,548\,466\,880\,512\,000\,000\,x^{78}}{a^{23}} - \frac{10\,640\,599\,348\,550\,453\,600\,940\,792\,424\,664\,137\,728\,000\,000\,x^{79}}{a^{22}} -$$

$$\frac{133\,007\,491\,856\,880\,670\,011\,759\,905\,308\,301\,721\,600\,000\,x^{80}}{a^{21}} - \frac{1\,642\,067\,800\,702\,230\,493\,972\,344\,509\,979\,033\,600\,000\,x^{81}}{a^{20}} -$$

$$\frac{20\,025\,217\,081\,734\,518\,219\,174\,933\,048\,524\,800\,000\,x^{82}}{a^{19}} - \frac{241\,267\,675\,683\,548\,412\,279\,216\,060\,825\,600\,000\,x^{83}}{a^{18}} -$$

$$\frac{2\,872\,234\,234\,327\,957\,289\,038\,286\,438\,400\,000\,x^{84}}{a^{17}} - \frac{33\,790\,990\,992\,093\,615\,165\,156\,311\,040\,000\,x^{85}}{a^{16}} - \frac{392\,918\,499\,908\,065\,292\,618\,096\,640\,000\,x^{86}}{a^{15}} -$$

$$\frac{4\,516\,304\,596\,644\,428\,650\,782\,720\,000\,x^{87}}{a^{14}}-\frac{51\,321\,643\,143\,686\,689\,213\,440\,000\,x^{88}}{a^{13}}-\frac{576\,647\,675\,771\,760\,552\,960\,000\,x^{89}}{a^{12}}-\frac{6\,407\,196\,397\,464\,006\,144\,000\,x^{90}}{a^{11}}-\frac{70\,408\,751\,620\,483\,584\,000\,x^{91}}{a^{10}}-\frac{765\,312\,517\,613\,952\,000\,x^{92}}{a^{9}}-\frac{8\,229\,166\,856\,064\,000\,x^{93}}{a^{8}}-\frac{87\,544\,328\,256\,000\,x^{94}}{a^{7}}-\frac{921\,519\,244\,800\,x^{95}}{a^{6}}-\frac{9\,599\,158\,800\,x^{96}}{a^{5}}-\frac{98\,960\,400\,x^{97}}{a^{4}}-\frac{1\,009\,800\,x^{98}}{a^{3}}-\frac{10\,200\,x^{99}}{a^{2}}-\frac{102\,x^{100}}{a}-\frac{102\,x^{101}}{101}-\frac{a\,x^{102}}{101}\Bigg)+\frac{1}{101}x^{101}\,\text{Gamma}[2,\,a\,x]$$

Problem 18: Result more than twice size of optimal antiderivative.

$$\int x^2\,\text{Gamma}[2,\,a\,x]\,dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{3}x^3\,\text{Gamma}[2,\,a\,x]-\frac{\text{Gamma}[5,\,a\,x]}{3\,a^3}$$

Result (type 4, 55 leaves):

$$e^{-a\,x}\left(-\frac{8}{a^3}-\frac{8\,x}{a^2}-\frac{4\,x^2}{a}-\frac{4\,x^3}{3}-\frac{a\,x^4}{3}\right)+\frac{1}{3}x^3\,\text{Gamma}[2,\,a\,x]$$

Problem 21: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Gamma}[2,\,a\,x]}{x}\,dx$$

Optimal (type 4, 14 leaves, 2 steps):

$$-e^{-a\,x}+\text{ExpIntegralEi}[-a\,x]$$

Result (type 4, 41 leaves):

$$-e^{-a\,x}+\text{ExpIntegralEi}[-a\,x]-e^{-a\,x}\,(1+a\,x)\,\text{Log}[a\,x]+\text{Gamma}[2,\,a\,x]\,\text{Log}[a\,x]$$

Problem 25: Result more than twice size of optimal antiderivative.

$$\int x^{100}\,\text{Gamma}[3,\,a\,x]\,dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{101}x^{101}\,\text{Gamma}[3,\,a\,x]-\frac{\text{Gamma}[104,\,a\,x]}{101\,a^{101}}$$

Result (type 4, 846 leaves):

$\frac{1}{101}\left(-\frac{1}{a^{101}}\, e^{-a x}\right.$

(99 029 007 164 861 804 075 467 152 545 817 733 490 901 658 221 144 924 830 052 805 546 998 766 658 416 222 832 141 441 073 883 538 492 653 516 385 \
977 292 093 222 882 134 415 149 891 584 000 000 000 000 000 000 000 000 +
99 029 007 164 861 804 075 467 152 545 817 733 490 901 658 221 144 924 830 052 805 546 998 766 658 416 222 832 141 441 073 883 538 492 653 516 385 \
977 292 093 222 882 134 415 149 891 584 000 000 000 000 000 000 000 000 a x +
49 514 503 582 430 902 037 733 576 272 908 866 745 450 829 110 572 462 415 026 402 773 499 383 329 208 111 416 070 720 536 941 769 246 326 758 192 \
988 646 046 611 441 067 207 574 945 792 000 000 000 000 000 000 000 000 $a^2 x^2$ +
16 504 834 527 476 967 345 911 192 090 969 622 248 483 609 703 524 154 138 342 134 257 833 127 776 402 703 805 356 906 845 647 256 415 442 252 730 \
996 215 348 870 480 355 735 858 315 264 000 000 000 000 000 000 000 000 $a^3 x^3$ +
4 126 208 631 869 241 836 477 798 022 742 405 562 120 902 425 881 038 534 585 533 564 458 281 944 100 675 951 339 226 711 411 814 103 860 563 182 \
749 053 837 217 620 088 933 964 578 816 000 000 000 000 000 000 000 000 $a^4 x^4$ +
825 241 726 373 848 367 295 559 604 548 481 112 424 180 485 176 207 706 917 106 712 891 656 388 820 135 190 267 845 342 282 362 820 772 112 636 549 \
810 767 443 524 017 786 792 915 763 200 000 000 000 000 000 000 000 $a^5 x^5$ +
137 540 287 728 974 727 882 593 267 424 746 852 070 696 747 529 367 951 152 851 118 815 276 064 803 355 865 044 640 890 380 393 803 462 018 772 758 \
301 794 573 920 669 631 132 152 627 200 000 000 000 000 000 000 000 $a^6 x^6$ +
19 648 612 532 710 675 411 799 038 203 535 264 581 528 106 789 909 707 307 550 159 830 753 723 543 336 552 149 234 412 911 484 829 066 002 681 822 \
614 542 081 988 667 090 161 736 089 600 000 000 000 000 000 000 000 $a^7 x^7$ +
2 456 076 566 588 834 426 474 879 775 441 908 072 691 013 348 738 713 413 443 769 978 844 215 442 917 069 018 654 301 613 935 603 633 250 335 227 \
826 817 760 248 583 386 270 217 011 200 000 000 000 000 000 000 000 $a^8 x^8$ +
272 897 396 287 648 269 608 319 975 049 100 896 965 668 149 859 857 045 938 196 664 316 023 938 101 896 557 628 255 734 881 733 737 027 815 025 314 \
090 862 249 842 598 474 468 556 800 000 000 000 000 000 000 000 $a^9 x^9$ +
27 289 739 628 764 826 960 831 997 504 910 089 696 566 814 985 985 704 593 819 666 431 602 393 810 189 655 762 825 573 488 173 373 702 781 502 531 \
409 086 224 984 259 847 446 855 680 000 000 000 000 000 000 000 $a^{10} x^{10}$ +
2 480 885 420 796 802 450 984 727 045 900 917 245 142 437 725 998 700 417 619 969 675 600 217 619 108 150 523 893 233 953 470 306 700 252 863 866 \
491 735 111 362 205 440 676 986 880 000 000 000 000 000 000 000 $a^{11} x^{11}$ +
206 740 451 733 066 870 915 393 920 491 743 103 761 869 810 499 891 701 468 330 806 300 018 134 925 679 210 324 436 162 789 192 225 021 071 988 874 \
311 259 280 183 786 723 082 240 000 000 000 000 000 000 000 $a^{12} x^{12}$ +
15 903 111 671 774 374 685 799 532 345 518 700 289 374 600 807 683 977 036 025 446 638 462 933 455 821 477 717 264 320 214 553 248 078 543 999 144 \
177 789 175 398 752 824 852 480 000 000 000 000 000 000 000 $a^{13} x^{13}$ +
1 135 936 547 983 883 906 128 538 024 679 907 163 526 757 200 548 855 502 573 246 188 461 638 103 987 248 408 376 022 872 468 089 148 467 428 510 \
298 413 512 528 482 344 632 320 000 000 000 000 000 000 000 $a^{14} x^{14}$ +
75 729 103 198 925 593 741 902 534 978 660 477 568 450 480 036 590 366 838 216 412 564 109 206 932 483 227 225 068 191 497 872 609 897 828 567 353 \
227 567 501 898 822 975 488 000 000 000 000 000 000 000 $a^{15} x^{15}$ +
4 733 068 949 932 849 608 868 908 436 166 279 848 028 155 002 286 897 927 388 525 785 256 825 433 280 201 701 566 761 968 617 038 118 614 285 459 \
576 722 968 868 676 435 968 000 000 000 000 000 000 000 $a^{16} x^{16}$ +
278 415 820 584 285 271 109 935 790 362 722 344 001 656 176 605 111 642 787 560 340 309 225 025 487 070 688 327 456 586 389 237 536 389 075 615 269 \
218 998 168 745 672 704 000 000 000 000 000 000 000 $a^{17} x^{17}$ +
15 467 545 588 015 848 394 996 432 797 929 019 111 203 120 922 506 202 377 086 685 572 734 723 638 170 593 795 969 810 354 957 640 910 504 200 848 \
289 944 342 708 092 928 000 000 000 000 000 000 000 $a^{18} x^{18}$ +
814 081 346 737 676 231 315 601 726 206 790 479 537 006 364 342 431 704 057 193 977 512 353 875 693 189 147 156 305 808 155 665 311 079 168 465 699 \
470 754 879 373 312 000 000 000 000 000 000 000 $a^{19} x^{19}$ +
40 704 067 336 883 811 565 780 086 310 339 523 976 850 318 217 121 585 202 859 698 875 617 693 784 659 457 357 815 290 407 783 265 553 958 423 284 \
973 537 743 968 665 600 000 000 000 000 000 000 $a^{20} x^{20}$ +

1 938 288 920 803 991 026 941 908 871 920 929 713 183 348 486 529 599 295 374 271 375 029 413 989 745 688 445 610 251 924 180 155 502 569 448 727 ⋱
855 882 749 712 793 600 000 000 000 000 000 000 a^{21} x^{21} +
88 104 041 854 726 864 860 995 857 814 587 714 235 606 749 387 709 058 880 648 698 864 973 363 170 258 565 709 556 905 644 552 522 844 065 851 266 ⋱
176 488 623 308 800 000 000 000 000 000 000 a^{22} x^{22} +
3 830 610 515 422 907 167 869 385 122 373 378 879 808 989 103 813 437 342 636 899 950 651 015 790 011 241 987 372 039 375 850 109 688 872 428 315 ⋱
920 716 896 665 600 000 000 000 000 000 000 a^{23} x^{23} +
159 608 771 475 954 465 327 891 046 765 557 453 325 374 545 992 226 555 943 204 164 610 458 991 250 468 416 140 501 640 660 421 237 036 351 179 830 ⋱
029 870 694 400 000 000 000 000 000 000 a^{24} x^{24} +
6 384 350 859 038 178 613 115 641 870 622 298 133 014 981 839 689 062 237 728 166 584 418 359 650 018 736 645 620 065 626 416 849 481 454 047 193 ⋱
201 194 827 776 000 000 000 000 000 000 a^{25} x^{25} +
245 551 956 116 853 023 581 370 841 177 780 697 423 653 147 680 348 547 604 929 484 016 090 755 769 951 409 446 925 601 016 032 672 363 617 199 738 ⋱
507 493 376 000 000 000 000 000 000 a^{26} x^{26} +
9 094 516 893 216 778 651 161 883 006 584 470 274 950 116 580 753 649 911 293 684 593 188 546 509 998 200 349 886 133 370 964 173 050 504 340 731 ⋱
055 833 088 000 000 000 000 000 000 a^{27} x^{27} +
324 804 174 757 742 094 684 352 964 520 873 938 391 075 592 169 773 211 117 631 592 613 876 661 071 364 298 210 219 048 963 006 180 375 155 026 109 ⋱
136 896 000 000 000 000 000 000 a^{28} x^{28} +
11 200 143 957 163 520 506 356 998 776 581 859 944 519 848 005 854 248 659 228 675 607 375 057 278 322 906 834 835 139 619 414 006 219 832 931 934 ⋱
797 824 000 000 000 000 000 000 a^{29} x^{29} +
373 338 131 905 450 683 545 233 292 552 728 664 817 328 266 861 808 288 640 955 853 579 168 575 944 096 894 494 504 653 980 466 873 994 431 064 493 ⋱
260 800 000 000 000 000 000 a^{30} x^{30} +
12 043 165 545 337 118 824 039 783 630 733 182 736 042 847 318 122 848 020 675 995 276 747 373 417 551 512 725 629 182 386 466 673 354 659 066 596 ⋱
556 800 000 000 000 000 000 a^{31} x^{31} +
376 348 923 291 784 963 251 243 238 460 411 960 501 338 978 691 339 000 646 124 852 398 355 419 298 484 772 675 911 949 577 083 542 333 095 831 142 ⋱
400 000 000 000 000 000 a^{32} x^{32} +
11 404 512 827 023 786 765 189 189 044 254 907 893 979 969 051 252 696 989 276 510 678 738 043 009 044 993 111 391 271 199 305 561 888 881 691 852 ⋱
800 000 000 000 000 000 a^{33} x^{33} +
335 426 847 853 640 787 211 446 736 595 732 585 117 057 913 272 138 146 743 426 784 668 765 970 854 264 503 276 213 858 803 104 761 437 696 819 200 ⋱
000 000 000 000 000 a^{34} x^{34} +
9 583 624 224 389 736 777 469 906 759 878 073 860 487 368 950 632 518 478 383 622 419 107 599 167 264 700 093 606 110 251 517 278 898 219 909 120 ⋱
000 000 000 000 000 a^{35} x^{35} +
266 211 784 010 826 021 596 386 298 885 502 051 680 204 693 073 125 513 288 433 956 086 322 199 090 686 113 711 280 840 319 924 413 839 441 920 000 ⋱
000 000 000 000 a^{36} x^{36} +
7 194 913 081 373 676 259 361 791 861 770 325 721 086 613 326 300 689 548 336 052 867 197 897 272 721 246 316 521 103 792 430 389 563 228 160 000 ⋱
000 000 000 000 a^{37} x^{37} +
189 339 817 930 886 217 351 626 101 625 534 887 397 016 140 165 807 619 693 054 022 820 997 296 650 559 113 592 660 626 116 589 199 032 320 000 000 ⋱
000 000 000 a^{38} x^{38} +
4 854 867 126 432 979 932 092 976 964 757 304 805 051 695 901 687 374 863 924 462 123 615 315 298 732 284 963 914 375 028 630 492 282 880 000 000 ⋱
000 000 000 a^{39} x^{39} +
121 371 678 160 824 498 302 324 424 118 932 620 126 292 397 542 184 371 598 111 553 090 382 882 468 307 124 097 859 375 715 762 307 072 000 000 000 ⋱
000 000
a^{40}
x^{40} +
2 960 284 833 190 841 422 007 912 783 388 600 490 885 180 427 858 155 404 831 989 099 765 436 157 763 588 392 630 716 480 872 251 392 000 000 000 ⋱
000 000

a^{41}
x^{41} +
70 482 972 218 829 557 666 855 066 271 157 154 544 885 248 282 337 033 448 380 692 851 558 003 756 275 914 110 255 154 306 482 176 000 000 000 000
000
a^{42}
x^{42} +
1 639 138 888 809 989 713 182 675 959 794 352 431 276 401 122 845 047 289 497 225 415 152 511 715 262 230 560 703 608 239 685 632 000 000 000 000 000

a^{43}
x^{43} +
37 253 156 563 863 402 572 333 544 540 780 737 074 463 661 882 841 983 852 209 668 526 193 448 074 141 603 652 354 732 720 128 000 000 000 000 000
a^{44}
x^{44} +
827 847 923 641 408 946 051 856 545 350 683 046 099 192 486 285 377 418 937 992 633 915 409 957 203 146 747 830 105 171 558 400 000 000 000 000
a^{45} x^{45} +
17 996 693 992 204 542 305 475 142 290 232 240 132 591 141 006 203 856 933 434 622 476 421 955 591 372 755 387 610 981 990 400 000 000 000 000
a^{46} x^{46} +
382 908 382 812 862 602 244 151 963 621 962 556 012 577 468 217 103 339 009 247 286 732 382 033 858 994 795 481 084 723 200 000 000 000 000 a^{47} x^{47} +
7 977 257 975 267 970 880 086 499 242 124 219 916 928 697 254 522 986 229 359 318 473 591 292 372 062 391 572 522 598 400 000 000 000 000 a^{48} x^{48} +
162 801 183 168 734 099 593 602 025 349 473 875 855 687 699 071 897 678 150 190 172 930 434 538 205 354 930 051 481 600 000 000 000 000 a^{49} x^{49} +
3 256 023 663 374 681 991 872 040 506 989 477 517 113 753 981 437 953 563 003 803 458 608 690 764 107 098 601 029 632 000 000 000 000 a^{50} x^{50} +
63 843 601 242 640 823 370 040 009 940 970 147 394 387 332 969 371 638 490 270 656 051 150 799 296 217 619 628 032 000 000 000 000 a^{51} x^{51} +
1 227 761 562 358 477 372 500 769 421 941 733 603 738 217 941 718 685 355 582 128 000 983 669 217 234 954 223 616 000 000 000 000 a^{52} x^{52} +
23 165 312 497 329 761 745 297 536 263 051 577 429 022 980 032 428 025 577 021 283 037 427 721 079 904 796 672 000 000 000 000 a^{53} x^{53} +
428 987 268 469 069 661 949 954 375 241 695 878 315 240 370 970 889 362 537 431 167 359 772 612 590 829 568 000 000 000 000 a^{54} x^{54} +
7 799 768 517 619 448 399 090 079 549 849 015 969 368 006 744 925 261 137 044 203 042 904 956 592 560 537 600 000 000 000 a^{55} x^{55} +
139 281 580 671 775 864 269 465 706 247 303 856 595 857 263 302 236 806 018 646 482 909 017 082 010 009 600 000 000 000 a^{56} x^{56} +
2 443 536 503 013 611 653 850 275 548 198 313 273 611 530 935 126 961 509 099 061 103 666 966 351 052 800 000 000 000 a^{57} x^{57} +
42 129 939 707 131 235 411 211 647 382 729 539 200 198 809 226 326 922 570 673 467 304 602 868 121 600 000 000 000 a^{58} x^{58} +
714 066 774 697 139 583 240 875 379 368 297 274 579 640 834 344 524 111 367 346 903 467 845 222 400 000 000 000 a^{59} x^{59} +
11 901 112 911 618 993 054 014 589 656 138 287 909 660 680 572 408 735 189 455 781 724 464 087 040 000 000 000 a^{60} x^{60} +
195 100 211 665 885 132 033 026 059 936 693 244 420 666 894 629 651 396 548 455 438 105 968 640 000 000 000 a^{61} x^{61} +
3 146 777 607 514 276 323 113 323 547 366 020 071 301 078 945 639 538 654 007 345 775 902 720 000 000 000 a^{62} x^{62} +
49 948 850 912 925 021 001 798 786 466 127 302 719 064 745 168 881 565 936 624 536 125 440 000 000 000 a^{63} x^{63} +
780 450 795 514 453 453 153 106 038 533 239 104 985 386 643 263 774 467 759 758 376 960 000 000 000 a^{64} x^{64} +
12 006 935 315 606 976 202 355 477 515 895 986 230 544 409 896 365 761 042 457 821 184 000 000 000 a^{65} x^{65} +
181 923 262 357 681 457 611 446 629 028 727 064 099 157 725 702 511 530 946 330 624 000 000 000 a^{66} x^{66} +
2 715 272 572 502 708 322 558 904 910 876 523 344 763 548 144 813 604 939 497 472 000 000 000 a^{67} x^{67} +
39 930 479 007 392 769 449 395 660 454 066 519 775 934 531 541 376 543 227 904 000 000 000 a^{68} x^{68} +
578 702 594 310 040 136 947 763 194 986 471 301 100 500 457 121 399 177 216 000 000 000 a^{69} x^{69} +
8 267 179 918 714 859 099 253 759 928 378 161 444 292 863 673 162 845 388 800 000 000 a^{70} x^{70} +
116 439 153 784 716 325 341 602 252 512 368 471 046 378 361 593 842 892 800 000 000 a^{71} x^{71} +
1 617 210 469 232 171 185 300 031 284 894 006 542 310 810 577 692 262 400 000 000 a^{72} x^{72} +
22 153 568 071 673 577 880 822 346 368 411 048 524 805 624 351 948 800 000 000 a^{73} x^{73} +

$299\,372\,541\,509\,102\,403\,794\,896\,572\,546\,095\,250\,335\,211\,139\,891\,200\,000\,000\, a^{74} x^{74} +$
$3\,991\,633\,886\,788\,032\,050\,598\,620\,967\,281\,270\,004\,469\,481\,865\,216\,000\,000\, a^{75} x^{75} +$
$52\,521\,498\,510\,368\,842\,771\,034\,486\,411\,595\,657\,953\,545\,814\,016\,000\,000\, a^{76} x^{76} +$
$682\,097\,383\,251\,543\,412\,610\,837\,485\,864\,878\,674\,721\,374\,208\,000\,000\, a^{77} x^{77} +$
$8\,744\,838\,246\,814\,659\,136\,036\,378\,023\,908\,700\,957\,966\,336\,000\,000\, a^{78} x^{78} + 110\,694\,155\,022\,970\,368\,810\,587\,063\,593\,781\,024\,784\,384\,000\,000\, a^{79} x^{79} +$
$1\,383\,676\,937\,787\,129\,610\,132\,338\,294\,922\,262\,809\,804\,800\,000\, a^{80} x^{80} + 17\,082\,431\,330\,705\,303\,828\,794\,299\,937\,311\,886\,540\,800\,000\, a^{81} x^{81} +$
$208\,322\,333\,301\,284\,193\,034\,076\,828\,503\,803\,494\,400\,000\, a^{82} x^{82} + 2\,509\,907\,630\,135\,954\,132\,940\,684\,680\,768\,716\,800\,000\, a^{83} x^{83} +$
$29\,879\,852\,739\,713\,739\,677\,865\,293\,818\,675\,200\,000\, a^{84} x^{84} + 351\,527\,679\,290\,749\,878\,563\,121\,103\,749\,120\,000\, a^{85} x^{85} +$
$4\,087\,531\,154\,543\,603\,239\,106\,059\,345\,920\,000\, a^{86} x^{86} + 46\,983\,116\,718\,891\,991\,254\,092\,636\,160\,000\, a^{87} x^{87} +$
$533\,899\,053\,623\,772\,627\,887\,416\,320\,000\, a^{88} x^{88} + 5\,998\,865\,771\,053\,625\,032\,442\,880\,000\, a^{89} x^{89} + 66\,654\,064\,122\,818\,055\,916\,032\,000\, a^{90} x^{90} +$
$732\,462\,243\,107\,890\,724\,352\,000\, a^{91} x^{91} + 7\,961\,546\,120\,737\,942\,656\,000\, a^{92} x^{92} + 85\,608\,022\,803\,633\,792\,000\, a^{93} x^{93} +$
$910\,723\,646\,847\,168\,000\, a^{94} x^{94} + 9\,586\,564\,703\,654\,400\, a^{95} x^{95} + 99\,860\,048\,996\,400\, a^{96} x^{96} + 1\,029\,485\,041\,200\, a^{97} x^{97} +$
$10\,504\,949\,400\, a^{98} x^{98} + 106\,110\,600\, a^{99} x^{99} + 1\,061\,106\, a^{100} x^{100} + 10\,506\, a^{101} x^{101} + 103\, a^{102} x^{102} + a^{103} x^{103}\Big) + x^{101}\,\text{Gamma}[3, a x]\Big)$

Problem 26: Result more than twice size of optimal antiderivative.

$$\int x^2\,\text{Gamma}[3, a x]\, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{3} x^3\,\text{Gamma}[3, a x] - \frac{\text{Gamma}[6, a x]}{3 a^3}$$

Result (type 4, 62 leaves):

$$\frac{1}{3}\left(-\frac{e^{-a x}\left(120 + 120 a x + 60 a^2 x^2 + 20 a^3 x^3 + 5 a^4 x^4 + a^5 x^5\right)}{a^3} + x^3\,\text{Gamma}[3, a x]\right)$$

Problem 27: Result more than twice size of optimal antiderivative.

$$\int x\,\text{Gamma}[3, a x]\, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{2} x^2\,\text{Gamma}[3, a x] - \frac{\text{Gamma}[5, a x]}{2 a^2}$$

Result (type 4, 53 leaves):

$$e^{-a x}\left(-\frac{12}{a^2} - \frac{12 x}{a} - 6 x^2 - 2 a x^3 - \frac{a^2 x^4}{2}\right) + \frac{1}{2} x^2\,\text{Gamma}[3, a x]$$

Problem 28: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}[3, a\,x]\, dx$$

Optimal (type 4, 18 leaves, 1 step):

$$x\,\text{Gamma}[3, a\,x] - \frac{\text{Gamma}[4, a\,x]}{a}$$

Result (type 4, 38 leaves):

$$e^{-a\,x}\left(-\frac{6}{a} - 6\,x - 3\,a\,x^2 - a^2\,x^3\right) + x\,\text{Gamma}[3, a\,x]$$

Problem 29: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[3, a\,x]}{x}\, dx$$

Optimal (type 4, 23 leaves, 3 steps):

$$-2\,e^{-a\,x} + 2\,\text{ExpIntegralEi}[-a\,x] - \text{Gamma}[2, a\,x]$$

Result (type 4, 56 leaves):

$$e^{-a\,x}\,(-3 - a\,x) + 2\,\text{ExpIntegralEi}[-a\,x] - e^{-a\,x}\,(2 + 2\,a\,x + a^2\,x^2)\,\text{Log}[a\,x] + \text{Gamma}[3, a\,x]\,\text{Log}[a\,x]$$

Problem 33: Result more than twice size of optimal antiderivative.

$$\int x^{100}\,\text{Gamma}[-1, a\,x]\, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{101}\,x^{101}\,\text{Gamma}[-1, a\,x] - \frac{\text{Gamma}[100, a\,x]}{101\,a^{101}}$$

Result (type 4, 820 leaves):

$$\frac{1}{101\,a^{101}}\,e^{-a\,x}$$
$$\big(-933\,262\,154\,439\,441\,526\,816\,992\,388\,562\,667\,004\,907\,159\,682\,643\,816\,214\,685\,929\,638\,952\,175\,999\,932\,299\,156\,089\,414\,639\,761\,565\,182\,862\,536\,979\,208\,272\,\backslash$$
$$237\,582\,511\,852\,109\,168\,640\,000\,000\,000\,000\,000\,000\,000 -$$
$$933\,262\,154\,439\,441\,526\,816\,992\,388\,562\,667\,004\,907\,159\,682\,643\,816\,214\,685\,929\,638\,952\,175\,999\,932\,299\,156\,089\,414\,639\,761\,565\,182\,862\,536\,979\,208\,272\,\backslash$$
$$237\,582\,511\,852\,109\,168\,640\,000\,000\,000\,000\,000\,000\,000\,a\,x -$$
$$466\,631\,077\,219\,720\,763\,408\,496\,194\,281\,333\,502\,453\,579\,841\,321\,908\,107\,342\,964\,819\,476\,087\,999\,966\,149\,578\,044\,707\,319\,880\,782\,591\,431\,268\,489\,604\,136\,\backslash$$

118 791 255 926 054 584 320 000 000 000 000 000 000 000 $a^2 x^2$ –
155 543 692 406 573 587 802 832 064 760 444 500 817 859 947 107 302 702 447 654 939 825 362 666 655 383 192 681 569 106 626 927 530 477 089 496 534 712 \
039 597 085 308 684 861 440 000 000 000 000 000 000 000 $a^3 x^3$ –
38 885 923 101 643 396 950 708 016 190 111 125 204 464 986 776 825 675 611 913 734 956 340 666 663 845 798 170 392 276 656 731 882 619 272 374 133 678 \
009 899 271 327 171 215 360 000 000 000 000 000 000 000 $a^4 x^4$ –
7 777 184 620 328 679 390 141 603 238 022 225 040 892 997 355 365 135 122 382 746 991 268 133 332 769 159 634 078 455 331 346 376 523 854 474 826 735 \
601 979 854 265 434 243 072 000 000 000 000 000 000 000 $a^5 x^5$ –
1 296 197 436 721 446 565 023 600 539 670 370 840 148 832 892 560 855 853 730 457 831 878 022 222 128 193 272 346 409 221 891 062 753 975 745 804 455 \
933 663 309 044 239 040 512 000 000 000 000 000 000 000 $a^6 x^6$ –
185 171 062 388 778 080 717 657 219 952 910 120 021 261 841 794 407 979 104 351 118 839 717 460 304 027 610 335 201 317 413 008 964 853 677 972 065 133 \
380 472 720 605 577 216 000 000 000 000 000 000 000 $a^7 x^7$ –
23 146 382 798 597 260 089 707 152 494 113 765 002 657 730 224 300 997 388 043 889 854 964 682 538 003 451 291 900 164 676 626 120 606 709 746 508 141 \
672 559 090 075 697 152 000 000 000 000 000 000 000 $a^8 x^8$ –
2 571 820 310 955 251 121 078 572 499 345 973 889 184 192 247 144 555 265 338 209 983 884 964 726 444 827 921 322 240 519 625 124 511 856 638 500 904 \
630 284 343 341 744 128 000 000 000 000 000 000 000 $a^9 x^9$ –
257 182 031 095 525 112 107 857 249 934 597 388 918 419 224 714 455 526 533 820 998 388 496 472 644 482 792 132 224 051 962 512 451 185 663 850 090 463 \
028 434 334 174 412 800 000 000 000 000 000 000 $a^{10} x^{10}$ –
23 380 184 645 047 737 464 350 659 084 963 398 992 583 565 883 132 320 593 983 727 126 226 952 058 589 344 739 293 095 632 955 677 380 514 895 462 769 \
366 221 303 106 764 800 000 000 000 000 000 000 $a^{11} x^{11}$ –
1 948 348 720 420 644 788 695 888 257 080 283 249 381 963 823 594 360 049 498 643 927 185 579 338 215 778 728 274 424 636 079 639 781 709 574 621 897 \
447 185 108 592 230 400 000 000 000 000 000 000 $a^{12} x^{12}$ –
149 872 978 493 895 752 976 606 789 006 175 634 567 843 371 045 720 003 807 587 994 398 890 718 324 290 671 405 724 972 006 126 137 054 582 663 222 880 \
552 700 660 940 800 000 000 000 000 000 000 $a^{13} x^{13}$ –
10 705 212 749 563 982 355 471 913 500 441 116 754 845 955 074 694 285 986 256 285 314 206 479 880 306 476 528 980 355 143 294 724 075 327 333 087 348 \
610 907 190 067 200 000 000 000 000 000 000 $a^{14} x^{14}$ –
713 680 849 970 932 157 031 460 900 029 407 783 656 397 004 979 619 065 750 419 020 947 098 658 687 098 435 265 357 009 552 981 605 021 822 205 823 240 \
727 146 004 480 000 000 000 000 000 000 $a^{15} x^{15}$ –
44 605 053 123 183 259 814 466 306 251 837 986 478 524 812 811 226 191 609 401 188 809 193 666 167 943 652 204 084 813 097 061 350 313 863 887 863 952 \
545 446 625 280 000 000 000 000 000 000 $a^{16} x^{16}$ –
2 623 826 654 304 897 636 145 076 838 343 410 969 324 988 988 895 658 329 964 775 812 305 509 774 584 920 717 887 341 946 885 961 783 168 463 991 997 \
208 555 683 840 000 000 000 000 000 000 $a^{17} x^{17}$ –
145 768 147 461 383 202 008 059 824 352 411 720 518 054 943 827 536 573 886 931 989 572 528 320 810 273 373 215 963 441 493 664 543 509 359 110 666 511 \
586 426 880 000 000 000 000 000 000 $a^{18} x^{18}$ –
7 672 007 761 125 431 684 634 727 597 495 353 711 476 575 990 922 977 572 996 420 503 817 280 042 645 967 011 366 496 920 719 186 500 492 584 771 921 \
662 443 520 000 000 000 000 000 000 $a^{19} x^{19}$ –
383 600 388 056 271 584 231 736 379 874 767 685 573 828 799 546 148 878 649 821 025 190 864 002 132 298 350 568 324 846 035 959 325 024 629 238 596 083 \
122 176 000 000 000 000 000 000 $a^{20} x^{20}$ –
18 266 685 145 536 742 106 273 160 946 417 508 836 848 990 454 578 518 030 943 858 342 422 095 339 633 254 788 967 849 811 236 158 334 506 154 218 861 \
101 056 000 000 000 000 000 000 $a^{21} x^{21}$ –
830 303 870 251 670 095 739 689 133 928 068 583 493 135 929 753 569 001 406 539 015 564 640 697 256 057 035 862 174 991 419 825 378 841 188 828 130 050 \
048 000 000 000 000 000 000 $a^{22} x^{22}$ –
36 100 168 271 811 743 293 029 962 344 698 634 064 918 953 467 546 478 322 023 435 459 332 204 228 524 218 950 529 347 453 035 886 036 573 427 310 002 \
176 000 000 000 000 000 000 $a^{23} x^{23}$ –
1 504 173 677 992 155 970 542 915 097 695 776 419 371 623 061 147 769 930 084 309 810 805 508 509 521 842 456 272 056 143 876 495 251 523 892 804 583 \

424 000 000 000 000 000 000 a^{24} x^{24} –
60 166 947 119 686 238 821 716 603 907 831 056 774 864 922 445 910 797 203 372 392 432 220 340 380 873 698 250 882 245 755 059 810 060 955 712 183 336
960 000 000 000 000 000 a^{25} x^{25} –
2 314 113 350 757 163 031 604 484 765 685 809 875 956 343 170 996 569 123 206 630 478 162 320 783 879 757 625 033 932 529 040 761 925 421 373 545 512
960 000 000 000 000 000 a^{26} x^{26} –
85 707 901 879 894 927 096 462 398 729 104 069 479 864 561 888 761 819 378 023 351 043 048 917 921 472 504 630 886 389 964 472 663 904 495 316 500 480
000 000 000 000 000 a^{27} x^{27} –
3 060 996 495 710 533 110 587 942 811 753 716 767 138 020 067 455 779 263 500 833 965 823 175 640 052 589 451 103 085 355 874 023 710 874 832 732 160
000 000 000 000 000 a^{28} x^{28} –
105 551 603 300 363 210 709 929 062 474 266 095 418 552 416 119 164 802 189 683 929 855 971 573 794 916 877 624 244 322 616 345 645 202 580 439 040 000
000 000 000 000 a^{29} x^{29} –
3 518 386 776 678 773 690 330 968 749 142 203 180 618 413 870 638 826 739 656 130 995 199 052 459 830 562 587 474 810 753 878 188 173 419 347 968 000
000 000 000 000 a^{30} x^{30} –
113 496 347 634 799 151 300 998 991 907 813 005 826 400 447 439 962 152 892 133 257 909 646 853 542 921 373 789 510 024 318 651 231 400 624 128 000 000
000 000 000 a^{31} x^{31} –
3 546 760 863 587 473 478 156 218 497 119 156 432 075 013 982 498 817 277 879 164 309 676 464 173 216 292 930 922 188 259 957 850 981 269 504 000 000
000 000 000 a^{32} x^{32} –
107 477 601 926 893 135 701 703 590 821 792 619 153 788 302 499 964 159 935 732 251 808 377 702 218 675 543 361 278 432 119 934 878 220 288 000 000 000
000 000 a^{33} x^{33} –
3 161 105 939 026 268 697 108 929 141 817 429 975 111 420 661 763 651 762 815 654 464 952 285 359 372 810 098 861 130 356 468 672 888 832 000 000 000
000 000 a^{34} x^{34} –
90 317 312 543 607 677 060 255 118 337 640 856 431 754 876 050 390 050 366 161 556 141 493 867 410 651 717 110 318 010 184 819 225 395 200 000 000 000 000

a^{35}
x^{35} –
2 508 814 237 322 435 473 895 975 509 378 912 678 659 857 668 066 390 287 948 932 115 041 496 316 962 547 697 508 833 616 244 978 483 200 000 000 000 000
a^{36} x^{36} –
67 805 790 197 903 661 456 647 986 739 970 612 936 752 909 947 740 278 052 673 840 947 067 468 026 014 802 635 373 881 520 134 553 600 000 000 000 000
a^{37} x^{37} –
1 784 362 899 944 833 196 227 578 598 420 279 287 809 287 103 887 902 054 017 732 656 501 775 474 368 810 595 667 733 724 214 067 200 000 000 000 000 a^{38}
x^{38} – 45 752 894 870 380 338 364 809 707 651 802 033 020 750 951 381 741 078 308 146 991 192 353 217 291 507 963 991 480 351 902 924 800 000 000 000 000
a^{39} x^{39} –
1 143 822 371 759 508 459 120 242 691 295 050 825 518 773 784 543 526 957 703 674 779 808 830 432 287 699 099 787 008 797 573 120 000 000 000 000 a^{40} x^{40} –
27 898 106 628 280 694 124 883 968 080 367 093 305 335 945 964 476 267 261 065 238 531 922 693 470 431 685 360 658 751 160 320 000 000 000 000 a^{41} x^{41} –
664 240 634 006 683 193 449 618 287 627 787 935 841 332 046 773 244 458 596 791 393 617 206 987 391 230 603 825 208 360 960 000 000 000 000 a^{42} x^{42} –
15 447 456 604 806 585 894 177 169 479 715 998 507 937 954 576 121 964 153 413 753 339 935 046 218 400 711 716 865 310 720 000 000 000 000 a^{43} x^{43} –
351 078 559 200 149 679 413 117 488 175 363 602 453 135 331 275 499 185 304 858 030 453 069 232 236 379 811 746 938 880 000 000 000 000 a^{44} x^{44} –
7 801 745 760 003 326 209 180 388 626 119 191 165 625 229 583 899 981 895 663 511 787 845 982 938 586 218 038 820 864 000 000 000 000 a^{45} x^{45} –
169 603 168 695 724 482 808 269 317 959 112 851 426 635 425 736 956 128 166 598 082 344 477 889 969 265 609 539 584 000 000 000 000 a^{46} x^{46} –
3 608 578 057 355 840 059 750 411 020 406 656 413 332 668 632 701 194 216 310 597 496 691 018 935 516 289 564 672 000 000 000 000 a^{47} x^{47} –
75 178 709 528 246 667 911 466 896 258 472 008 611 097 263 181 274 879 506 470 781 181 062 894 489 922 699 264 000 000 000 000 a^{48} x^{48} –
1 534 259 378 127 483 018 601 365 229 764 734 869 614 229 860 842 344 479 723 893 493 491 079 479 386 177 536 000 000 000 000 a^{49} x^{49} –
30 685 187 562 549 660 372 027 304 595 294 697 392 284 597 216 846 889 594 477 869 869 821 589 587 723 550 720 000 000 000 a^{50} x^{50} –
601 670 344 363 718 830 824 064 795 986 170 537 103 619 553 271 507 639 107 409 213 133 756 658 582 814 720 000 000 000 a^{51} x^{51} –

$11\,570\,583\,545\,456\,131\,362\,001\,246\,076\,657\,125\,713\,531\,145\,255\,221\,300\,752\,065\,561\,791\,033\,781\,895\,823\,360\,000\,000\,000\, a^{52} x^{52} -$
$218\,312\,897\,084\,077\,950\,226\,438\,605\,219\,945\,768\,179\,832\,929\,343\,798\,127\,397\,463\,430\,019\,505\,318\,789\,120\,000\,000\,000\, a^{53} x^{53} -$
$4\,042\,831\,427\,482\,925\,004\,193\,307\,504\,073\,069\,781\,108\,017\,210\,070\,335\,692\,545\,619\,074\,435\,283\,681\,280\,000\,000\,000\, a^{54} x^{54} -$
$73\,506\,025\,954\,235\,000\,076\,241\,954\,619\,510\,359\,656\,509\,403\,819\,460\,648\,955\,374\,892\,262\,459\,703\,296\,000\,000\,000\, a^{55} x^{55} -$
$1\,312\,607\,606\,325\,625\,001\,361\,463\,475\,348\,399\,279\,580\,525\,068\,204\,654\,445\,631\,694\,504\,686\,780\,416\,000\,000\,000\, a^{56} x^{56} -$
$23\,028\,203\,619\,747\,807\,041\,429\,183\,778\,042\,092\,624\,219\,738\,038\,678\,148\,168\,977\,096\,573\,452\,288\,000\,000\,000\, a^{57} x^{57} -$
$397\,037\,993\,443\,927\,707\,610\,847\,996\,173\,139\,528\,003\,788\,586\,873\,761\,175\,327\,191\,320\,231\,936\,000\,000\,000\, a^{58} x^{58} -$
$6\,729\,457\,515\,998\,774\,705\,268\,610\,104\,629\,483\,525\,487\,942\,150\,402\,731\,785\,206\,632\,546\,304\,000\,000\,000\, a^{59} x^{59} -$
$112\,157\,625\,266\,646\,245\,087\,810\,168\,410\,491\,392\,091\,465\,702\,506\,712\,196\,420\,110\,542\,438\,400\,000\,000\, a^{60} x^{60} -$
$1\,838\,649\,594\,535\,184\,345\,701\,806\,039\,516\,252\,329\,368\,290\,205\,028\,068\,793\,772\,303\,974\,400\,000\,000\, a^{61} x^{61} -$
$29\,655\,638\,621\,535\,231\,382\,287\,194\,185\,746\,005\,312\,391\,777\,500\,452\,722\,480\,198\,451\,200\,000\,000\, a^{62} x^{62} -$
$470\,724\,422\,564\,051\,291\,782\,336\,415\,646\,761\,989\,085\,583\,769\,848\,455\,912\,384\,102\,400\,000\,000\, a^{63} x^{63} -$
$7\,355\,069\,102\,563\,301\,434\,099\,006\,494\,480\,656\,079\,462\,246\,403\,882\,123\,631\,001\,600\,000\,000\, a^{64} x^{64} -$
$113\,154\,909\,270\,204\,637\,447\,677\,022\,992\,010\,093\,530\,188\,406\,213\,571\,132\,784\,640\,000\,000\, a^{65} x^{65} -$
$1\,714\,468\,322\,275\,827\,840\,116\,318\,530\,181\,971\,114\,093\,763\,730\,508\,653\,527\,040\,000\,000\, a^{66} x^{66} -$
$25\,589\,079\,436\,952\,654\,330\,094\,306\,420\,626\,434\,538\,712\,891\,500\,129\,157\,120\,000\,000\, a^{67} x^{67} -$
$376\,309\,991\,719\,891\,975\,442\,563\,329\,715\,094\,625\,569\,307\,227\,943\,075\,840\,000\,000\, a^{68} x^{68} -$
$5\,453\,767\,995\,940\,463\,412\,211\,062\,749\,494\,125\,008\,250\,829\,390\,479\,360\,000\,000\, a^{69} x^{69} -$
$77\,910\,971\,370\,578\,048\,745\,872\,324\,992\,773\,214\,403\,583\,277\,006\,848\,000\,000\, a^{70} x^{70} -$
$1\,097\,337\,624\,937\,718\,996\,420\,736\,971\,729\,200\,202\,867\,370\,098\,688\,000\,000\, a^{71} x^{71} -$
$15\,240\,800\,346\,357\,208\,283\,621\,346\,829\,572\,225\,039\,824\,584\,704\,000\,000\, a^{72} x^{72} -$
$208\,778\,086\,936\,400\,113\,474\,265\,025\,062\,633\,219\,723\,624\,448\,000\,000\, a^{73} x^{73} - 2\,821\,325\,499\,140\,542\,073\,976\,554\,392\,738\,286\,753\,021\,952\,000\,000\, a^{74} x^{74} -$
$37\,617\,673\,321\,873\,894\,319\,687\,391\,903\,177\,156\,706\,959\,360\,000\, a^{75} x^{75} - 494\,969\,385\,814\,130\,188\,416\,939\,367\,147\,067\,851\,407\,360\,000\, a^{76} x^{76} -$
$6\,428\,173\,841\,741\,950\,498\,921\,290\,482\,429\,452\,615\,680\,000\, a^{77} x^{77} - 82\,412\,485\,150\,537\,826\,909\,247\,313\,877\,300\,674\,560\,000\, a^{78} x^{78} -$
$1\,043\,196\,014\,563\,769\,960\,876\,548\,276\,927\,856\,640\,000\, a^{79} x^{79} - 13\,039\,950\,182\,047\,124\,510\,956\,853\,461\,598\,208\,000\, a^{80} x^{80} -$
$160\,987\,039\,284\,532\,401\,369\,837\,697\,056\,768\,000\, a^{81} x^{81} - 1\,963\,256\,576\,640\,639\,041\,095\,581\,671\,424\,000\, a^{82} x^{82} -$
$23\,653\,693\,694\,465\,530\,615\,609\,417\,728\,000\, a^{83} x^{83} - 281\,591\,591\,600\,780\,126\,376\,302\,592\,000\, a^{84} x^{84} - 3\,312\,842\,254\,126\,825\,016\,191\,795\,200\, a^{85} x^{85} -$
$38\,521\,421\,559\,614\,244\,374\,323\,200\, a^{86} x^{86} - 442\,774\,960\,455\,336\,142\,233\,600\, a^{87} x^{87} - 5\,031\,533\,641\,537\,910\,707\,200\, a^{88} x^{88} -$
$56\,534\,085\,859\,976\,524\,800\, a^{89} x^{89} - 628\,156\,509\,555\,294\,720\, a^{90} x^{90} - 6\,902\,818\,786\,321\,920\, a^{91} x^{91} - 75\,030\,638\,981\,760\, a^{92} x^{92} -$
$806\,781\,064\,320\, a^{93} x^{93} - 8\,582\,777\,280\, a^{94} x^{94} - 90\,345\,024\, a^{95} x^{95} - 941\,094\, a^{96} x^{96} - 9702\, a^{97} x^{97} - 99\, a^{98} x^{98} - a^{99} x^{99} + a^{101} e^{a x} x^{101} \text{Gamma}[-1, a x] \Big)$

Problem 38: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-1, a x]}{x} \, dx$$

Optimal (type 5, 39 leaves, 2 steps):

$$-\text{Gamma}[-1, a x] - a x \,\text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] + \text{EulerGamma}\,\text{Log}[x] + \frac{1}{2} \text{Log}[a x]^2$$

Result (type 5, 103 leaves):

$$-\frac{e^{-a x}}{a x}-a x \,\text{HypergeometricPFQ}[\{1,1,1\},\{2,2,2\},-a x]+\text{EulerGamma}\,\text{Log}[x]+\text{Gamma}[0,a x]\,\text{Log}[x]-\frac{\text{Log}[x]^2}{2}+\text{ExpIntegralEi}[-a x]\,(-1+\text{Log}[x]-\text{Log}[a x])-\frac{e^{-a x}\,\text{Log}[a x]}{a x}+\text{Gamma}[-1,a x]\,\text{Log}[a x]+\text{Log}[x]\,\text{Log}[a x]$$

Problem 39: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-1,a x]}{x^2}\,dx$$

Optimal (type 4, 18 leaves, 1 step):

$$a\,\text{Gamma}[-2,a x]-\frac{\text{Gamma}[-1,a x]}{x}$$

Result (type 4, 42 leaves):

$$\frac{1}{2}\left(\frac{e^{-a x}(1-a x)}{a x^2}-a\,\text{ExpIntegralEi}[-a x]-\frac{2\,\text{Gamma}[-1,a x]}{x}\right)$$

Problem 40: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-1,a x]}{x^3}\,dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{2}a^2\,\text{Gamma}[-3,a x]-\frac{\text{Gamma}[-1,a x]}{2 x^2}$$

Result (type 4, 58 leaves):

$$e^{-a x}\left(\frac{1}{6 a x^3}-\frac{1}{12 x^2}+\frac{a}{12 x}\right)+\frac{1}{12}a^2\,\text{ExpIntegralEi}[-a x]-\frac{\text{Gamma}[-1,a x]}{2 x^2}$$

Problem 41: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-1,a x]}{x^4}\,dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{3}a^3\,\text{Gamma}[-4,a x]-\frac{\text{Gamma}[-1,a x]}{3 x^3}$$

Result (type 4, 68 leaves):

$$e^{-a x}\left(\frac{1}{12\,a\,x^4}-\frac{1}{36\,x^3}+\frac{a}{72\,x^2}-\frac{a^2}{72\,x}\right)-\frac{1}{72}\,a^3\,\text{ExpIntegralEi}[-a\,x]-\frac{\text{Gamma}[-1,\,a\,x]}{3\,x^3}$$

Problem 42: Result more than twice size of optimal antiderivative.

$$\int x^{100}\,\text{Gamma}[-2,\,a\,x]\,dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{101}\,x^{101}\,\text{Gamma}[-2,\,a\,x]-\frac{\text{Gamma}[99,\,a\,x]}{101\,a^{101}}$$

Result (type 4, 812 leaves):

$$\frac{1}{101\,a^{101}}\,e^{-a x}$$

(– 9 426 890 448 883 247 745 626 185 743 057 242 473 809 693 764 078 951 663 494 238 777 294 707 070 023 223 798 882 976 159 207 729 119 823 605 850 588 ⋱
608 460 429 412 647 567 360 000 000 000 000 000 000 000 –
9 426 890 448 883 247 745 626 185 743 057 242 473 809 693 764 078 951 663 494 238 777 294 707 070 023 223 798 882 976 159 207 729 119 823 605 850 588 ⋱
608 460 429 412 647 567 360 000 000 000 000 000 000 000 a x –
4 713 445 224 441 623 872 813 092 871 528 621 236 904 846 882 039 475 831 747 119 388 647 353 535 011 611 899 441 488 079 603 864 559 911 802 925 294 ⋱
304 230 214 706 323 783 680 000 000 000 000 000 000 000 a^2 x^2 –
1 571 148 408 147 207 957 604 364 290 509 540 412 301 615 627 346 491 943 915 706 462 882 451 178 337 203 966 480 496 026 534 621 519 970 600 975 098 ⋱
101 410 071 568 774 594 560 000 000 000 000 000 000 000 a^3 x^3 –
392 787 102 036 801 989 401 091 072 627 385 103 075 403 906 836 622 985 978 926 615 720 612 794 584 300 991 620 124 006 633 655 379 992 650 243 774 525 ⋱
352 517 892 193 648 640 000 000 000 000 000 000 000 a^4 x^4 –
78 557 420 407 360 397 880 218 214 525 477 020 615 080 781 367 324 597 195 785 323 144 122 558 916 860 198 324 024 801 326 731 075 998 530 048 754 905 ⋱
070 503 578 438 729 728 000 000 000 000 000 000 000 a^5 x^5 –
13 092 903 401 226 732 980 036 369 087 579 503 435 846 796 894 554 099 532 630 887 190 687 093 152 810 033 054 004 133 554 455 179 333 088 341 459 150 ⋱
845 083 929 739 788 288 000 000 000 000 000 000 000 a^6 x^6 –
1 870 414 771 603 818 997 148 052 726 797 071 919 406 685 270 650 585 647 518 698 170 098 156 164 687 147 579 143 447 650 636 454 190 441 191 637 021 ⋱
549 297 704 248 541 184 000 000 000 000 000 000 000 a^7 x^7 –
233 801 846 450 477 374 643 506 590 849 633 989 925 835 658 831 323 205 939 837 271 262 269 520 585 893 447 392 930 956 329 556 773 805 148 954 627 693 ⋱
662 213 031 067 648 000 000 000 000 000 000 000 a^8 x^8 –
25 977 982 938 941 930 515 945 176 761 070 443 325 092 850 981 258 133 993 315 252 362 474 391 176 210 383 043 658 995 147 728 530 422 794 328 291 965 ⋱
962 468 114 563 072 000 000 000 000 000 000 000 a^9 x^9 –
2 597 798 293 894 193 051 594 517 676 107 044 332 509 285 098 125 813 399 331 525 236 247 439 117 621 038 304 365 899 514 772 853 042 279 432 829 196 ⋱
596 246 811 456 307 200 000 000 000 000 000 000 a^{10} x^{10} –
236 163 481 263 108 459 235 865 243 282 458 575 682 662 281 647 801 218 121 047 748 749 767 192 511 003 482 215 081 774 070 259 367 479 948 439 017 872 ⋱
386 073 768 755 200 000 000 000 000 000 000 a^{11} x^{11} –
19 680 290 105 259 038 269 655 436 940 204 881 306 888 523 470 650 101 510 087 312 395 813 932 709 250 290 184 590 147 839 188 280 623 329 036 584 822 ⋱
698 839 480 729 600 000 000 000 000 000 000 a^{12} x^{12} –
1 513 868 469 635 310 636 127 341 303 092 683 177 452 963 343 896 161 654 622 100 953 524 148 669 942 330 014 199 242 141 476 021 586 409 925 891 140 ⋱
207 603 036 979 200 000 000 000 000 000 000 a^{13} x^{13} –

108 133 462 116 807 902 580 524 378 792 334 512 675 211 667 421 154 403 901 578 639 537 439 190 710 166 429 585 660 152 962 572 970 457 851 849 367 157 685 931 212 800 000 000 000 000 000 000 $a^{14}\,x^{14}$ –

7 208 897 474 453 860 172 034 958 586 155 634 178 347 444 494 743 626 926 771 909 302 495 946 047 344 428 639 044 010 197 504 864 697 190 123 291 143 845 728 747 520 000 000 000 000 000 000 $a^{15}\,x^{15}$ –

450 556 092 153 366 260 752 184 911 634 727 136 146 715 280 921 476 682 923 244 331 405 996 627 959 026 789 940 250 637 344 054 043 574 382 705 696 490 358 046 720 000 000 000 000 000 000 $a^{16}\,x^{16}$ –

26 503 299 538 433 309 456 010 877 154 983 949 185 100 898 877 733 922 524 896 725 376 823 331 056 413 340 584 720 625 726 120 826 092 610 747 393 911 197 532 160 000 000 000 000 000 000 $a^{17}\,x^{17}$ –

1 472 405 529 912 961 636 445 048 730 832 441 621 394 494 382 096 329 029 160 929 187 601 296 169 800 741 143 595 590 318 117 823 671 811 708 188 550 622 085 120 000 000 000 000 000 000 $a^{18}\,x^{18}$ –

77 495 027 890 155 875 602 370 985 833 286 401 126 026 020 110 333 106 797 943 641 452 699 798 410 565 323 347 136 332 532 517 035 358 510 957 292 138 004 480 000 000 000 000 000 000 $a^{19}\,x^{19}$ –

3 874 751 394 507 793 780 118 549 291 664 320 056 301 301 005 516 655 339 897 182 072 634 989 920 528 266 167 356 816 626 625 851 767 925 547 864 606 900 224 000 000 000 000 000 000 $a^{20}\,x^{20}$ –

184 511 971 167 037 799 053 264 251 984 015 240 776 252 428 834 126 444 757 008 670 125 475 710 501 346 007 969 372 220 315 516 750 853 597 517 362 233 344 000 000 000 000 000 000 $a^{21}\,x^{21}$ –

8 386 907 780 319 899 956 966 556 908 364 329 126 193 292 219 733 020 216 227 666 823 885 259 568 243 000 362 244 191 832 523 488 675 163 523 516 465 152 000 000 000 000 000 000 $a^{22}\,x^{22}$ –

364 648 164 361 734 780 737 676 387 320 188 222 877 969 226 944 913 922 444 681 166 255 880 850 793 173 928 793 225 731 848 847 333 702 761 892 020 224 000 000 000 000 000 000 $a^{23}\,x^{23}$ –

15 193 673 515 072 282 530 736 516 138 341 175 953 248 717 789 371 413 435 195 048 593 995 035 449 715 580 366 384 405 493 701 972 237 615 078 834 176 000 000 000 000 000 000 $a^{24}\,x^{24}$ –

607 746 940 602 891 301 229 460 645 533 647 038 129 948 711 574 856 537 407 801 943 759 801 417 988 623 214 655 376 219 748 078 889 504 603 153 367 040 000 000 000 000 000 $a^{25}\,x^{25}$ –

23 374 882 330 880 434 662 671 563 289 755 655 312 690 335 060 571 405 284 915 459 375 376 977 614 947 046 717 514 469 990 310 726 519 407 813 591 040 000 000 000 000 000 $a^{26}\,x^{26}$ –

865 736 382 625 201 283 802 650 492 213 172 418 988 530 928 169 311 306 848 720 717 606 554 726 479 520 248 796 832 221 863 360 241 459 548 651 520 000 000 000 000 000 $a^{27}\,x^{27}$ –

30 919 156 522 328 617 278 666 089 007 613 300 678 161 818 863 189 689 530 311 454 200 234 097 374 268 580 314 172 579 352 262 865 766 412 451 840 000 000 000 000 000 $a^{28}\,x^{28}$ –

1 066 177 811 114 779 906 160 899 620 952 182 782 005 579 960 799 644 466 562 463 937 939 106 806 009 261 390 143 882 046 629 753 991 945 256 960 000 000 000 000 000 $a^{29}\,x^{29}$ –

35 539 260 370 492 663 538 696 654 031 739 426 066 852 665 359 988 148 885 415 464 597 970 226 866 975 379 671 462 734 887 658 466 398 175 232 000 000 000 000 000 $a^{30}\,x^{30}$ –

1 146 427 753 886 860 114 151 504 968 765 787 937 640 408 559 999 617 705 981 144 019 289 362 156 999 205 795 853 636 609 279 305 367 683 072 000 000 000 000 000 $a^{31}\,x^{31}$ –

35 825 867 308 964 378 567 234 530 273 930 873 051 262 767 499 988 053 311 910 750 602 792 567 406 225 181 120 426 144 039 978 292 740 096 000 000 000 000 000 $a^{32}\,x^{32}$ –

1 085 632 342 695 890 259 613 167 584 058 511 304 583 720 227 272 365 251 876 083 351 599 774 769 885 611 549 103 822 546 666 008 870 912 000 000 000 000 000 $a^{33}\,x^{33}$ –

31 930 363 020 467 360 576 857 870 119 367 979 546 580 006 684 481 330 937 531 863 282 346 316 761 341 516 150 112 427 843 117 907 968 000 000 000 000 000

a^{34}
x^{34} –

912 296 086 299 067 445 053 082 003 410 513 701 330 857 333 842 323 741 072 338 950 924 180 478 895 471 890 003 212 224 089 083 084 800 000 000 000 000 $a^{35} x^{35}$ −
25 341 557 952 751 873 473 696 722 316 958 713 925 857 148 162 286 770 585 342 748 636 782 791 080 429 774 722 311 450 669 141 196 800 000 000 000 000 $a^{36} x^{36}$ −
684 906 971 695 996 580 370 181 684 242 127 403 401 544 544 926 669 475 279 533 746 940 075 434 606 210 127 630 039 207 274 086 400 000 000 000 000 $a^{37} x^{37}$ − 18 023 867 676 210 436 325 531 096 953 740 194 826 356 435 392 807 091 454 724 572 287 896 721 963 321 319 148 158 926 507 212 800 000 000 000 000 $a^{38} x^{38}$ −
462 150 453 236 165 033 987 976 844 967 697 303 239 908 599 815 566 447 557 040 315 074 274 922 136 444 080 722 023 756 595 200 000 000 000 000 $a^{39} x^{39}$ −
11 553 761 330 904 125 849 699 421 124 192 432 580 997 714 995 389 161 188 926 007 876 856 873 053 411 102 018 050 593 914 880 000 000 000 000 $a^{40} x^{40}$ −
281 799 056 851 320 142 675 595 637 175 425 184 902 383 292 570 467 346 071 366 045 776 996 903 741 734 195 562 209 607 680 000 000 000 000 $a^{41} x^{41}$ −
6 709 501 353 602 860 539 895 134 218 462 504 402 437 697 442 153 984 430 270 620 137 547 545 327 184 147 513 385 943 040 000 000 000 000 $a^{42} x^{42}$ −
156 034 915 200 066 524 183 607 772 522 383 823 312 504 591 677 999 637 913 270 235 756 919 658 771 724 360 776 417 280 000 000 000 000 $a^{43} x^{43}$ −
3 546 248 072 728 784 640 536 540 284 599 632 348 011 467 992 681 809 952 574 323 539 929 992 244 811 917 290 373 120 000 000 000 000 $a^{44} x^{44}$ −
78 805 512 727 306 325 345 256 450 768 880 718 844 699 288 726 262 443 390 540 523 109 555 383 218 042 606 452 736 000 000 000 000 $a^{45} x^{45}$ −
1 713 163 320 158 833 159 679 488 060 193 059 105 319 549 754 918 748 769 359 576 589 338 160 504 740 056 662 016 000 000 000 000 $a^{46} x^{46}$ −
36 450 283 407 634 748 078 286 980 004 107 640 538 713 824 572 739 335 518 288 863 602 939 585 207 235 248 128 000 000 000 000 $a^{47} x^{47}$ −
759 380 904 325 723 918 297 645 416 752 242 511 223 204 678 598 736 156 631 017 991 727 908 025 150 734 336 000 000 000 000 $a^{48} x^{48}$ −
15 497 569 476 035 182 006 074 396 260 249 847 167 820 503 644 872 166 461 857 510 035 263 429 084 708 864 000 000 000 000 $a^{49} x^{49}$ −
309 951 389 520 703 640 121 487 925 204 996 943 356 410 072 897 443 329 237 150 200 705 268 581 694 177 280 000 000 000 $a^{50} x^{50}$ −
6 077 478 225 896 149 806 303 684 807 941 116 536 400 197 507 793 006 455 630 396 092 260 168 268 513 280 000 000 000 $a^{51} x^{51}$ −
116 874 581 267 233 650 121 224 707 845 021 471 853 849 952 072 942 431 839 046 078 697 310 928 240 640 000 000 000 $a^{52} x^{52}$ −
2 205 180 778 627 050 002 287 258 638 585 310 789 695 282 114 583 819 468 661 246 767 873 791 098 880 000 000 000 $a^{53} x^{53}$ −
40 836 681 085 686 111 153 467 752 566 394 644 253 616 335 455 255 916 086 319 384 590 255 390 720 000 000 000 $a^{54} x^{54}$ −
742 485 110 648 838 384 608 504 592 116 266 259 156 660 644 641 016 656 114 897 901 641 007 104 000 000 000 $a^{55} x^{55}$ −
13 258 662 690 157 828 296 580 439 144 933 326 056 368 940 082 875 297 430 623 176 815 017 984 000 000 000 $a^{56} x^{56}$ −
232 608 117 371 189 970 115 446 300 788 303 965 901 209 475 138 163 112 817 950 470 438 912 000 000 000 $a^{57} x^{57}$ −
4 010 484 782 261 896 036 473 212 082 556 964 929 331 197 847 209 708 841 688 801 214 464 000 000 000 $a^{58} x^{58}$ −
67 974 318 343 421 966 719 884 950 551 812 964 903 918 607 579 825 573 587 945 783 296 000 000 000 $a^{59} x^{59}$ −
1 132 905 305 723 699 445 331 415 842 530 216 081 731 976 792 997 092 893 132 429 721 600 000 000 $a^{60} x^{60}$ −
18 572 218 126 618 023 693 957 636 762 790 427 569 376 668 737 657 260 543 154 585 600 000 000 $a^{61} x^{61}$ −
299 551 905 268 032 640 225 123 173 593 393 993 054 462 398 994 471 944 244 428 800 000 000 $a^{62} x^{62}$ −
4 754 792 147 111 629 209 922 590 057 037 999 889 753 371 412 610 665 781 657 600 000 000 $a^{63} x^{63}$ −
74 293 627 298 619 206 405 040 469 641 218 748 277 396 428 322 041 652 838 400 000 000 $a^{64} x^{64}$ −
1 142 978 881 517 218 560 077 545 686 787 980 742 729 175 820 339 102 351 360 000 000 $a^{65} x^{65}$ −
17 317 861 841 169 978 182 993 116 466 484 556 708 017 815 459 683 368 960 000 000 $a^{66} x^{66}$ −
258 475 549 868 208 629 596 912 186 066 933 682 209 221 126 263 930 880 000 000 $a^{67} x^{67}$ −
3 801 111 027 473 656 317 601 649 795 101 965 914 841 487 150 940 160 000 000 $a^{68} x^{68}$ −
55 088 565 615 560 236 486 980 431 813 071 969 780 311 407 984 640 000 000 $a^{69} x^{69}$ −
786 979 508 793 717 664 099 720 454 472 456 711 147 305 828 352 000 000 $a^{70} x^{70}$ −
11 084 218 433 714 333 297 179 161 330 597 981 847 145 152 512 000 000 $a^{71} x^{71}$ −
153 947 478 246 032 406 905 266 129 591 638 636 765 904 896 000 000 $a^{72} x^{72}$ − 2 108 869 565 014 142 560 346 111 364 269 022 421 450 752 000 000 $a^{73} x^{73}$ −
28 498 237 365 055 980 545 217 721 138 770 573 262 848 000 000 $a^{74} x^{74}$ − 379 976 498 200 746 407 269 569 615 183 607 643 504 640 000 $a^{75} x^{75}$ −
4 999 690 765 799 294 832 494 337 041 889 574 256 640 000 $a^{76} x^{76}$ − 64 931 048 906 484 348 473 952 429 115 449 016 320 000 $a^{77} x^{77}$ −
832 449 344 954 927 544 537 851 655 326 269 440 000 $a^{78} x^{78}$ − 10 537 333 480 442 120 816 934 831 080 079 360 000 $a^{79} x^{79}$ −

$131\,716\,668\,505\,526\,510\,211\,685\,388\,500\,992\,000\, a^{80} x^{80} - 1\,626\,131\,709\,944\,771\,731\,008\,461\,586\,432\,000\, a^{81} x^{81} - 19\,830\,874\,511\,521\,606\,475\,712\,946\,176\,000\, a^{82} x^{82} - 238\,926\,198\,933\,995\,258\,743\,529\,472\,000\, a^{83} x^{83} - 2\,844\,359\,511\,118\,991\,175\,518\,208\,000\, a^{84} x^{84} - 33\,463\,053\,071\,988\,131\,476\,684\,800\, a^{85} x^{85} - 389\,105\,268\,278\,931\,761\,356\,800\, a^{86} x^{86} - 4\,472\,474\,348\,033\,698\,406\,400\, a^{87} x^{87} - 50\,823\,572\,136\,746\,572\,800\, a^{88} x^{88} - 571\,051\,372\,322\,995\,200\, a^{89} x^{89} - 6\,345\,015\,248\,033\,280\, a^{90} x^{90} - 69\,725\,442\,286\,080\, a^{91} x^{91} - 757\,885\,242\,240\, a^{92} x^{92} - 8\,149\,303\,680\, a^{93} x^{93} - 86\,694\,720\, a^{94} x^{94} - 912\,576\, a^{95} x^{95} - 9506\, a^{96} x^{96} - 98\, a^{97} x^{97} - a^{98} x^{98} + a^{101} e^{a x} x^{101} \text{Gamma}[-2, a x])$

Problem 47: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-2, a x]}{x} \, dx$$

Optimal (type 5, 55 leaves, 3 steps):

$$-\frac{1}{2} \text{Gamma}[-2, a x] + \frac{1}{2} \text{Gamma}[-1, a x] + \frac{1}{2} a x \,\text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] - \frac{1}{2} \text{EulerGamma} \,\text{Log}[x] - \frac{1}{4} \text{Log}[a x]^2$$

Result (type 5, 121 leaves):

$$\text{Gamma}[-2, a x] \,\text{Log}[a x] + \frac{1}{4} \left(\frac{e^{-a x} (-1 + 3 a x)}{a^2 x^2} + 3 \,\text{ExpIntegralEi}[-a x] + 2 a x \,\text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] - 2 \,\text{ExpIntegralEi}[-a x] \,\text{Log}[x] + \text{Log}[x]^2 + \frac{2 e^{-a x} (-1 + a x) \,\text{Log}[a x]}{a^2 x^2} + 2 \,\text{ExpIntegralEi}[-a x] \,\text{Log}[a x] - 2 \,\text{Log}[x] \left(\text{EulerGamma} + \text{Gamma}[0, a x] + \text{Log}[a x]\right) \right)$$

Problem 48: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-2, a x]}{x^2} \, dx$$

Optimal (type 4, 18 leaves, 1 step):

$$a \,\text{Gamma}[-3, a x] - \frac{\text{Gamma}[-2, a x]}{x}$$

Result (type 4, 48 leaves):

$$\frac{1}{6} \left(\frac{e^{-a x} (2 - a x + a^2 x^2)}{a^2 x^3} + a \,\text{ExpIntegralEi}[-a x] - \frac{6 \,\text{Gamma}[-2, a x]}{x} \right)$$

Problem 49: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-2, a x]}{x^3} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{2} a^2 \text{Gamma}[-4, a x] - \frac{\text{Gamma}[-2, a x]}{2 x^2}$$

Result (type 4, 68 leaves):

$$e^{-a x} \left(\frac{1}{8 a^2 x^4} - \frac{1}{24 a x^3} + \frac{1}{48 x^2} - \frac{a}{48 x}\right) - \frac{1}{48} a^2 \text{ExpIntegralEi}[-a x] - \frac{\text{Gamma}[-2, a x]}{2 x^2}$$

Problem 50: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-2, a x]}{x^4} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{3} a^3 \text{Gamma}[-5, a x] - \frac{\text{Gamma}[-2, a x]}{3 x^3}$$

Result (type 4, 78 leaves):

$$e^{-a x} \left(\frac{1}{15 a^2 x^5} - \frac{1}{60 a x^4} + \frac{1}{180 x^3} - \frac{a}{360 x^2} + \frac{a^2}{360 x}\right) + \frac{1}{360} a^3 \text{ExpIntegralEi}[-a x] - \frac{\text{Gamma}[-2, a x]}{3 x^3}$$

Problem 51: Result more than twice size of optimal antiderivative.

$$\int x^{100} \text{Gamma}[-3, a x] \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{101} x^{101} \text{Gamma}[-3, a x] - \frac{\text{Gamma}[98, a x]}{101 a^{101}}$$

Result (type 4, 804 leaves):

$$\frac{1}{101 a^{101}} e^{-a x}$$

$$\Big(-96\,192\,759\,682\,482\,119\,853\,328\,425\,949\,563\,698\,712\,343\,813\,919\,172\,976\,158\,104\,477\,319\,333\,745\,612\,481\,875\,498\,805\,879\,175\,589\,072\,651\,261\,284\,189\,679\,678\,167\,647\,067\,832\,320\,000\,000\,000\,000\,000\,000\,000 -$$

$$96\,192\,759\,682\,482\,119\,853\,328\,425\,949\,563\,698\,712\,343\,813\,919\,172\,976\,158\,104\,477\,319\,333\,745\,612\,481\,875\,498\,805\,879\,175\,589\,072\,651\,261\,284\,189\,679\,678\,167\,647\,067\,832\,320\,000\,000\,000\,000\,000\,000\,000\, a x -$$

$$48\,096\,379\,841\,241\,059\,926\,664\,212\,974\,781\,849\,356\,171\,906\,959\,586\,488\,079\,052\,238\,659\,666\,872\,806\,240\,937\,749\,402\,939\,587\,794\,536\,325\,630\,642\,094\,839\,839\,083\,823\,533\,916\,160\,000\,000\,000\,000\,000\,000\,000\, a^2 x^2 -$$

$$16\,032\,126\,613\,747\,019\,975\,554\,737\,658\,260\,616\,452\,057\,302\,319\,862\,162\,693\,017\,412\,886\,555\,624\,268\,746\,979\,249\,800\,979\,862\,598\,178\,775\,210\,214\,031\,613\,279\,694\,607\,844\,638\,720\,000\,000\,000\,000\,000\,000\,000\, a^3 x^3 -$$

4 008 031 653 436 754 993 888 684 414 565 154 113 014 325 579 965 540 673 254 353 221 638 906 067 186 744 812 450 244 965 649 544 693 802 553 507 903
319 923 651 961 159 680 000 000 000 000 000 000 000 $a^4\, x^4$ −
801 606 330 687 350 998 777 736 882 913 030 822 602 865 115 993 108 134 650 870 644 327 781 213 437 348 962 490 048 993 129 908 938 760 510 701 580 663
984 730 392 231 936 000 000 000 000 000 000 000 $a^5\, x^5$ −
133 601 055 114 558 499 796 289 480 485 505 137 100 477 519 332 184 689 108 478 440 721 296 868 906 224 827 081 674 832 188 318 156 460 085 116 930 110
664 121 732 038 656 000 000 000 000 000 000 000 $a^6\, x^6$ −
19 085 865 016 365 499 970 898 497 212 215 019 585 782 502 761 740 669 872 639 777 245 899 552 700 889 261 011 667 833 169 759 736 637 155 016 704 301
523 445 961 719 808 000 000 000 000 000 000 000 $a^7\, x^7$ −
2 385 733 127 045 687 496 362 312 151 526 877 448 222 812 845 217 583 734 079 972 155 737 444 087 611 157 626 458 479 146 219 967 079 644 377 088 037
690 430 745 214 976 000 000 000 000 000 000 000 $a^8\, x^8$ −
265 081 458 560 631 944 040 256 905 725 208 605 358 090 316 135 287 081 564 441 350 637 493 787 512 350 847 384 275 460 691 107 453 293 819 676 448 632
270 082 801 664 000 000 000 000 000 000 000 $a^9\, x^9$ −
26 508 145 856 063 194 404 025 690 572 520 860 535 809 031 613 528 708 156 444 135 063 749 378 751 235 084 738 427 546 069 110 745 329 381 967 644 863
227 008 280 166 400 000 000 000 000 000 000 $a^{10}\, x^{10}$ −
2 409 831 441 460 290 400 365 971 870 229 169 139 619 002 873 957 155 286 949 466 823 977 216 250 112 280 430 766 140 551 737 340 484 489 269 785 896
657 000 752 742 400 000 000 000 000 000 000 $a^{11}\, x^{11}$ −
200 819 286 788 357 533 363 830 989 185 764 094 968 250 239 496 429 607 245 788 901 998 101 354 176 023 369 230 511 712 644 778 373 707 439 148 824 721
416 729 395 200 000 000 000 000 000 000 $a^{12}\, x^{12}$ −
15 447 637 445 258 271 797 217 768 398 904 930 382 173 095 345 879 200 557 368 377 076 777 027 244 309 489 940 808 593 280 367 567 208 264 549 909 593
955 133 030 400 000 000 000 000 000 000 $a^{13}\, x^{13}$ −
1 103 402 674 661 305 128 372 697 742 778 923 598 726 649 667 562 800 039 812 026 934 055 501 946 022 106 424 343 470 948 597 683 372 018 896 422 113
853 938 073 600 000 000 000 000 000 000 $a^{14}\, x^{14}$ −
73 560 178 310 753 675 224 846 516 185 261 573 248 443 311 170 853 335 987 468 462 270 366 796 401 473 761 622 898 063 239 845 558 134 593 094 807 590
262 538 240 000 000 000 000 000 000 $a^{15}\, x^{15}$ −
4 597 511 144 422 104 701 552 907 261 578 848 328 027 706 948 178 333 499 216 778 891 897 924 775 092 110 101 431 128 952 490 347 383 412 068 425 474
391 408 640 000 000 000 000 000 000 $a^{16}\, x^{16}$ −
270 441 832 024 829 688 326 641 603 622 285 195 766 335 702 834 019 617 600 986 993 641 054 398 534 830 005 966 536 997 205 314 551 965 415 789 733 787
729 920 000 000 000 000 000 000 $a^{17}\, x^{17}$ −
15 024 546 223 601 649 351 480 089 090 126 955 320 351 983 490 778 867 644 499 277 424 503 022 140 823 889 220 363 166 511 406 363 998 078 654 985 210
429 440 000 000 000 000 000 000 $a^{18}\, x^{18}$ −
790 765 590 715 876 281 656 846 794 217 208 174 755 367 552 146 256 191 815 751 443 394 895 902 148 625 748 440 166 658 495 071 789 372 560 788 695 285
760 000 000 000 000 000 000 $a^{19}\, x^{19}$ −
39 538 279 535 793 814 082 842 339 710 860 408 737 768 377 607 312 809 590 787 572 169 744 795 107 431 287 422 008 332 924 753 589 468 628 039 434 764
288 000 000 000 000 000 000 $a^{20}\, x^{20}$ −
1 882 775 215 990 181 622 992 492 367 183 828 987 512 779 886 062 514 742 418 455 817 606 895 005 115 775 591 524 206 329 750 170 927 077 525 687 369
728 000 000 000 000 000 000 $a^{21}\, x^{21}$ −
85 580 691 635 917 346 499 658 743 962 901 317 614 217 267 548 296 124 655 384 355 345 767 954 777 989 799 614 736 651 352 280 496 685 342 076 698 624
000 000 000 000 000 000 $a^{22}\, x^{22}$ −
3 720 899 636 344 232 456 506 901 911 430 492 070 183 359 458 621 570 637 190 624 145 468 171 946 869 121 722 379 854 406 620 891 160 232 264 204 288
000 000 000 000 000 000 $a^{23}\, x^{23}$ −
155 037 484 847 676 352 354 454 246 309 603 836 257 639 977 442 565 443 216 276 006 061 173 831 119 546 738 432 493 933 609 203 798 343 011 008 512 000
000 000 000 000 000 $a^{24}\, x^{24}$ −
6 201 499 393 907 054 094 178 169 852 384 153 450 305 599 097 702 617 728 651 040 242 446 953 244 781 869 537 299 757 344 368 151 933 720 440 340 480
000 000 000 000 000 $a^{25}\, x^{25}$ −

238 519 207 457 963 619 006 852 686 630 159 748 088 676 888 373 177 604 948 116 932 401 805 894 030 071 905 280 759 897 860 313 535 912 324 628 480 000 000 000 000 000 $a^{26} x^{26}$ −

8 834 044 720 665 319 222 476 025 430 746 657 336 617 662 532 339 911 294 374 701 200 066 884 964 076 737 232 620 736 957 789 390 218 974 986 240 000 000 000 000 000 $a^{27} x^{27}$ −

315 501 597 166 618 543 659 858 051 098 094 904 879 202 233 297 853 974 799 096 471 430 960 177 288 454 901 165 026 319 921 049 650 677 678 080 000 000 000 000 000 $a^{28} x^{28}$ −

10 879 365 419 538 570 471 029 587 968 899 824 306 179 387 355 098 412 924 106 774 876 929 661 285 808 789 695 345 735 169 691 367 264 747 520 000 000 000 000 000 $a^{29} x^{29}$ −

362 645 513 984 619 015 700 986 265 629 994 143 539 312 911 836 613 764 136 892 495 897 655 376 193 626 323 178 191 172 323 045 575 491 584 000 000 000 000 000 $a^{30} x^{30}$ −

11 698 242 386 600 613 409 709 234 375 161 101 404 493 964 897 955 282 714 093 306 319 279 205 683 665 365 263 812 618 462 033 728 241 664 000 000 000 000 000 $a^{31} x^{31}$ −

365 570 074 581 269 169 053 413 574 223 784 418 890 436 403 061 102 584 815 415 822 477 475 177 614 542 664 494 144 326 938 554 007 552 000 000 000 000 000 $a^{32} x^{32}$ −

11 077 881 047 917 247 547 073 138 612 841 952 087 588 981 910 942 502 570 164 115 832 650 762 958 016 444 378 610 434 149 653 151 744 000 000 000 000 000 $a^{33} x^{33}$ −

325 820 030 821 095 516 090 386 429 789 469 179 046 734 762 086 544 193 240 121 053 901 493 028 176 954 246 429 718 651 460 386 816 000 000 000 000 000 $a^{34} x^{34}$ −

9 309 143 737 745 586 174 011 040 851 127 690 829 906 707 488 186 976 949 717 744 397 185 515 090 770 121 326 563 390 041 725 337 600 000 000 000 000 $a^{35} x^{35}$ −

258 587 326 048 488 504 833 640 023 642 435 856 386 297 430 227 416 026 381 048 455 477 375 419 188 058 925 737 871 945 603 481 600 000 000 000 000 $a^{36} x^{36}$ −

6 988 846 649 959 148 779 287 568 206 552 320 442 872 903 519 659 892 604 893 201 499 388 524 842 920 511 506 428 971 502 796 800 000 000 000 000 $a^{37} x^{37}$ −

183 917 017 104 188 125 770 725 479 119 797 906 391 392 197 885 786 647 497 189 513 141 803 285 340 013 460 695 499 250 073 600 000 000 000 000 $a^{38} x^{38}$ −

4 715 820 951 389 439 122 326 294 336 405 074 522 856 210 202 199 657 628 133 064 439 533 417 572 820 857 966 551 262 822 400 000 000 000 000 $a^{39} x^{39}$ −

117 895 523 784 735 978 058 157 358 410 126 863 071 405 255 054 991 440 703 326 610 988 335 439 320 521 449 163 781 570 560 000 000 000 000 $a^{40} x^{40}$ −

2 875 500 580 115 511 659 955 057 522 198 216 172 473 298 903 780 279 041 544 551 487 520 376 568 793 206 077 165 404 160 000 000 000 000 $a^{41} x^{41}$ −

68 464 299 526 559 801 427 501 369 576 148 004 106 507 116 756 673 310 512 965 511 607 628 013 542 695 382 789 652 480 000 000 000 000 $a^{42} x^{42}$ −

1 592 193 012 245 576 777 383 752 780 840 651 258 290 863 180 387 751 407 278 267 711 805 302 640 527 799 599 759 360 000 000 000 000 $a^{43} x^{43}$ −

36 186 204 823 763 108 576 903 472 291 832 983 142 974 163 190 630 713 801 778 811 631 938 696 375 631 809 085 440 000 000 000 000 $a^{44} x^{44}$ −

804 137 884 972 513 523 931 188 273 151 844 069 843 870 293 125 126 973 372 862 480 709 748 808 347 373 535 232 000 000 000 000 $a^{45} x^{45}$ −

17 481 258 368 967 685 302 851 918 981 561 827 605 301 528 111 415 803 768 975 271 319 777 148 007 551 598 592 000 000 000 000 $a^{46} x^{46}$ −

371 941 667 424 844 368 145 785 510 245 996 332 027 692 087 476 931 995 084 580 240 846 322 298 033 012 736 000 000 000 000 $a^{47} x^{47}$ −

7 748 784 738 017 591 003 037 198 130 124 923 583 910 251 822 436 083 230 928 755 017 631 714 542 354 432 000 000 000 000 $a^{48} x^{48}$ −

158 138 464 041 175 326 592 595 880 206 631 093 549 188 812 702 777 208 794 464 388 114 932 949 843 968 000 000 000 000 $a^{49} x^{49}$ −

3 162 769 280 823 506 531 851 917 604 132 621 870 983 776 254 055 544 175 889 287 762 298 658 996 879 360 000 000 000 $a^{50} x^{50}$ −

62 015 083 937 715 814 350 037 600 081 031 801 391 838 750 079 520 474 037 044 858 084 287 431 311 360 000 000 000 $a^{51} x^{51}$ −

1 192 597 768 032 996 429 808 415 386 173 688 488 304 591 347 683 086 039 173 939 578 543 989 063 680 000 000 000 $a^{52} x^{52}$ −

22 501 844 679 867 857 166 196 516 720 258 273 364 237 572 597 794 076 210 829 048 651 773 378 560 000 000 000 $a^{53} x^{53}$ −

416 700 827 404 960 317 892 528 087 412 190 247 485 880 974 033 223 633 533 871 271 329 136 640 000 000 000 $a^{54} x^{54}$ −

$7\,576\,378\,680\,090\,187\,598\,045\,965\,225\,676\,186\,317\,925\,108\,618\,785\,884\,246\,070\,386\,751\,438\,848\,000\,000\,000\, a^{55} x^{55} -$
$135\,292\,476\,430\,181\,921\,393\,677\,950\,458\,503\,327\,105\,805\,511\,049\,747\,932\,965\,542\,620\,561\,408\,000\,000\,000\, a^{56} x^{56} -$
$2\,373\,552\,218\,073\,367\,041\,994\,350\,008\,043\,918\,019\,400\,096\,685\,083\,297\,069\,570\,923\,167\,744\,000\,000\,000\, a^{57} x^{57} -$
$40\,923\,314\,104\,713\,224\,861\,971\,551\,862\,826\,172\,748\,277\,529\,053\,160\,294\,302\,946\,951\,168\,000\,000\,000\, a^{58} x^{58} -$
$693\,615\,493\,300\,224\,150\,202\,907\,658\,691\,969\,029\,631\,822\,526\,324\,750\,750\,897\,405\,952\,000\,000\,000\, a^{59} x^{59} -$
$11\,560\,258\,221\,670\,402\,503\,381\,794\,311\,532\,817\,160\,530\,375\,438\,745\,845\,848\,290\,099\,200\,000\,000\, a^{60} x^{60} -$
$189\,512\,429\,863\,449\,221\,366\,914\,660\,844\,800\,281\,320\,170\,089\,159\,767\,964\,726\,067\,200\,000\,000\, a^{61} x^{61} -$
$3\,056\,652\,094\,571\,761\,634\,950\,236\,465\,238\,714\,214\,841\,453\,050\,963\,999\,431\,065\,600\,000\,000\, a^{62} x^{62} -$
$48\,518\,287\,215\,424\,787\,856\,352\,959\,765\,693\,876\,426\,054\,810\,332\,761\,895\,731\,200\,000\,000\, a^{63} x^{63} -$
$758\,098\,237\,741\,012\,310\,255\,514\,996\,338\,966\,819\,157\,106\,411\,449\,404\,620\,800\,000\,000\, a^{64} x^{64} -$
$11\,663\,049\,811\,400\,189\,388\,546\,384\,559\,061\,027\,987\,032\,406\,329\,990\,840\,320\,000\,000\, a^{65} x^{65} -$
$176\,712\,875\,930\,305\,899\,826\,460\,372\,106\,985\,272\,530\,794\,035\,302\,891\,520\,000\,000\, a^{66} x^{66} -$
$2\,637\,505\,610\,900\,088\,057\,111\,348\,837\,417\,690\,634\,787\,970\,676\,162\,560\,000\,000\, a^{67} x^{67} -$
$38\,786\,847\,219\,118\,942\,016\,343\,365\,256\,142\,509\,335\,117\,215\,825\,920\,000\,000\, a^{68} x^{68} -$
$562\,128\,220\,566\,941\,188\,642\,657\,467\,480\,326\,222\,248\,075\,591\,680\,000\,000\, a^{69} x^{69} -$
$8\,030\,403\,150\,956\,302\,694\,895\,106\,678\,290\,374\,603\,543\,937\,024\,000\,000\, a^{70} x^{70} -$
$113\,104\,269\,731\,778\,911\,195\,705\,727\,863\,244\,712\,725\,970\,944\,000\,000\, a^{71} x^{71} - 1\,570\,892\,635\,163\,595\,988\,829\,246\,220\,322\,843\,232\,305\,152\,000\,000\, a^{72} x^{72} -$
$21\,519\,077\,194\,021\,862\,860\,674\,605\,757\,847\,167\,565\,824\,000\,000\, a^{73} x^{73} - 290\,798\,340\,459\,754\,903\,522\,629\,807\,538\,475\,237\,376\,000\,000\, a^{74} x^{74} -$
$3\,877\,311\,206\,130\,065\,380\,301\,730\,767\,179\,669\,831\,680\,000\, a^{75} x^{75} - 51\,017\,252\,712\,237\,702\,372\,391\,194\,304\,995\,655\,680\,000\, a^{76} x^{76} -$
$662\,561\,723\,535\,554\,576\,264\,820\,705\,259\,683\,840\,000\, a^{77} x^{77} - 8\,494\,381\,070\,968\,648\,413\,651\,547\,503\,329\,280\,000\, a^{78} x^{78} -$
$107\,523\,811\,024\,919\,600\,172\,804\,398\,776\,320\,000\, a^{79} x^{79} - 1\,344\,047\,637\,811\,495\,002\,160\,054\,984\,704\,000\, a^{80} x^{80} -$
$16\,593\,180\,713\,722\,160\,520\,494\,505\,984\,000\, a^{81} x^{81} - 202\,355\,862\,362\,465\,372\,201\,152\,512\,000\, a^{82} x^{82} - 2\,438\,022\,438\,101\,992\,436\,158\,464\,000\, a^{83} x^{83} -$
$29\,024\,076\,644\,071\,338\,525\,696\,000\, a^{84} x^{84} - 341\,459\,725\,224\,368\,688\,537\,600\, a^{85} x^{85} - 3\,970\,461\,921\,213\,589\,401\,600\, a^{86} x^{86} -$
$45\,637\,493\,347\,282\,636\,800\, a^{87} x^{87} - 518\,607\,878\,946\,393\,600\, a^{88} x^{88} - 5\,827\,054\,819\,622\,400\, a^{89} x^{89} - 64\,745\,053\,551\,360\, a^{90} x^{90} -$
$711\,484\,104\,960\, a^{91} x^{91} - 7\,733\,522\,880\, a^{92} x^{92} - 83\,156\,160\, a^{93} x^{93} - 884\,640\, a^{94} x^{94} - 9312\, a^{95} x^{95} - 97\, a^{96} x^{96} - a^{97} x^{97} + a^{101} e^{a x} x^{101}\, \text{Gamma}[-3, a x])$

Problem 55: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}[-3, a x]\, dx$$

Optimal (type 4, 18 leaves, 1 step):

$$x\, \text{Gamma}[-3, a x] - \frac{\text{Gamma}[-2, a x]}{a}$$

Result (type 4, 40 leaves):

$$\frac{1}{2} \left(\frac{e^{-a x} (-1 + a x)}{a^3 x^2} + \frac{\text{ExpIntegralEi}[-a x]}{a} + 2 x\, \text{Gamma}[-3, a x] \right)$$

Problem 56: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-3, a x]}{x} \, dx$$

Optimal (type 5, 64 leaves, 4 steps):

$$-\frac{1}{3} \text{Gamma}[-3, a x] + \frac{1}{6} \text{Gamma}[-2, a x] - \frac{1}{6} \text{Gamma}[-1, a x] - \frac{1}{6} a x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] + \frac{1}{6} \text{EulerGamma} \, \text{Log}[x] + \frac{1}{12} \text{Log}[a x]^2$$

Result (type 5, 145 leaves):

$$\text{Gamma}[-3, a x] \, \text{Log}[a x] + \frac{1}{36} \left(\frac{e^{-a x} \left(-4 + 5 a x - 11 a^2 x^2\right)}{a^3 x^3} - 11 \, \text{ExpIntegralEi}[-a x] - 6 a x \, \text{HypergeometricPFQ}[\{1, 1, 1\}, \{2, 2, 2\}, -a x] + 6 \, \text{ExpIntegralEi}[-a x] \, \text{Log}[x] - 3 \, \text{Log}[x]^2 - \frac{6 e^{-a x} \left(2 - a x + a^2 x^2 + a^3 e^{a x} x^3 \, \text{ExpIntegralEi}[-a x]\right) \text{Log}[a x]}{a^3 x^3} + 6 \, \text{Log}[x] \left(\text{EulerGamma} + \text{Gamma}[0, a x] + \text{Log}[a x]\right) \right)$$

Problem 57: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-3, a x]}{x^2} \, dx$$

Optimal (type 4, 18 leaves, 1 step):

$$a \, \text{Gamma}[-4, a x] - \frac{\text{Gamma}[-3, a x]}{x}$$

Result (type 4, 66 leaves):

$$e^{-a x} \left(\frac{1}{4 a^3 x^4} - \frac{1}{12 a^2 x^3} + \frac{1}{24 a x^2} - \frac{1}{24 x} \right) - \frac{1}{24} a \, \text{ExpIntegralEi}[-a x] - \frac{\text{Gamma}[-3, a x]}{x}$$

Problem 58: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-3, a x]}{x^3} \, dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{1}{2} a^2 \, \text{Gamma}[-5, a x] - \frac{\text{Gamma}[-3, a x]}{2 x^2}$$

Result (type 4, 78 leaves) :

$$e^{-a x}\left(\frac{1}{10\, a^3 x^5}-\frac{1}{40\, a^2 x^4}+\frac{1}{120\, a\, x^3}-\frac{1}{240\, x^2}+\frac{a}{240\, x}\right)+\frac{1}{240}\, a^2\, \text{ExpIntegralEi}[-a\, x]-\frac{\text{Gamma}[-3,\, a\, x]}{2\, x^2}$$

Problem 59: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-3,\, a\, x]}{x^4}\, dx$$

Optimal (type 4, 25 leaves, 1 step) :

$$\frac{1}{3}\, a^3\, \text{Gamma}[-6,\, a\, x]-\frac{\text{Gamma}[-3,\, a\, x]}{3\, x^3}$$

Result (type 4, 88 leaves) :

$$e^{-a x}\left(\frac{1}{18\, a^3 x^6}-\frac{1}{90\, a^2 x^5}+\frac{1}{360\, a\, x^4}-\frac{1}{1080\, x^3}+\frac{a}{2160\, x^2}-\frac{a^2}{2160\, x}\right)-\frac{a^3\, \text{ExpIntegralEi}[-a\, x]}{2160}-\frac{\text{Gamma}[-3,\, a\, x]}{3\, x^3}$$

Problem 60: Result more than twice size of optimal antiderivative.

$$\int x^{100}\, \text{Gamma}\left[\frac{1}{2},\, a\, x\right] dx$$

Optimal (type 4, 29 leaves, 1 step) :

$$\frac{1}{101}\, x^{101}\, \text{Gamma}\left[\frac{1}{2},\, a\, x\right]-\frac{\text{Gamma}\left[\frac{203}{2},\, a\, x\right]}{101\, a^{101}}$$

Result (type 4, 856 leaves) :

$$\frac{1}{256\,065\,421\,246\,102\,339\,102\,334\,047\,485\,952\, a^{101}}\, e^{-a x}\Big(-2\sqrt{a\, x}$$

$$\Big(1\,339\,928\,042\,684\,663\,702\,626\,654\,216\,353\,741\,866\,828\,222\,367\,324\,552\,136\,009\,000\,175\,903\,930\,373\,973\,956\,200\,201\,339\,808\,971\,908\,813\,302\,485\,337\,\cdot$$
$$859\,343\,555\,595\,880\,232\,757\,068\,702\,494\,068\,539\,027\,184\,400\,769\,291\,974\,725\,364\,464\,819\,431\,304\,931\,640\,625\,+$$
$$893\,285\,361\,789\,775\,801\,751\,102\,810\,902\,494\,577\,885\,481\,578\,216\,368\,090\,672\,666\,783\,935\,953\,582\,649\,304\,133\,467\,559\,872\,647\,939\,208\,868\,323\,558\,572\,\cdot$$
$$895\,703\,730\,586\,821\,838\,045\,801\,662\,712\,359\,351\,456\,267\,179\,527\,983\,150\,242\,976\,546\,287\,536\,621\,093\,750\, a\, x\,+$$
$$357\,314\,144\,715\,910\,320\,700\,441\,124\,360\,997\,831\,154\,192\,631\,286\,547\,236\,269\,066\,713\,574\,381\,433\,059\,721\,653\,387\,023\,949\,059\,175\,683\,547\,329\,423\,429\,\cdot$$
$$158\,281\,492\,234\,728\,735\,218\,320\,665\,084\,943\,740\,582\,506\,871\,811\,193\,260\,097\,190\,618\,515\,014\,648\,437\,500\, a^2\, x^2\,+$$
$$102\,089\,755\,633\,117\,234\,485\,840\,321\,245\,999\,380\,329\,769\,323\,224\,727\,781\,791\,161\,918\,164\,108\,980\,874\,206\,186\,682\,006\,842\,588\,335\,909\,584\,951\,263\,836\,\cdot$$
$$902\,366\,140\,638\,493\,924\,348\,091\,618\,595\,698\,211\,595\,001\,963\,374\,626\,645\,742\,054\,462\,432\,861\,328\,125\,000\, a^3\, x^3\,+$$
$$22\,686\,612\,362\,914\,940\,996\,853\,404\,721\,333\,195\,628\,837\,627\,383\,272\,840\,398\,035\,981\,814\,246\,440\,194\,268\,041\,484\,890\,409\,464\,074\,646\,574\,433\,614\,185\,\cdot$$
$$978\,303\,586\,808\,554\,205\,410\,687\,026\,354\,599\,602\,576\,667\,102\,972\,139\,254\,609\,345\,436\,096\,191\,406\,250\,000\, a^4\, x^4\,+$$
$$4\,124\,838\,611\,439\,080\,181\,246\,073\,585\,696\,944\,659\,788\,659\,524\,231\,425\,526\,915\,633\,057\,135\,716\,398\,957\,825\,724\,525\,528\,993\,468\,117\,558\,987\,929\,851\,\cdot$$
$$996\,055\,197\,601\,555\,310\,074\,670\,368\,428\,109\,018\,650\,303\,109\,631\,298\,046\,292\,608\,261\,108\,398\,437\,500\,000\, a^5\, x^5\,+$$

634 590 555 606 012 335 576 319 013 184 145 332 275 178 388 343 296 234 910 097 393 405 494 830 608 896 265 311 619 845 148 941 162 921 219 977 230
162 338 092 546 970 780 718 518 219 709 079 792 354 324 558 661 237 891 170 501 708 984 375 000 000 $a^6 x^6$ +
84 612 074 080 801 644 743 509 201 757 886 044 303 357 118 445 772 831 321 346 319 120 732 644 081 186 168 708 215 979 353 192 155 056 162 663 630
688 311 745 672 929 437 429 135 762 627 877 305 647 243 274 488 165 052 156 066 894 531 250 000 000 $a^7 x^7$ +
9 954 361 656 564 899 381 589 317 853 868 946 388 630 249 228 914 450 743 687 802 249 497 958 127 198 372 789 201 879 923 904 959 418 372 078 074
198 624 911 255 638 757 344 604 207 367 985 565 370 263 914 645 666 476 724 243 164 062 500 000 000 $a^8 x^8$ +
1 047 827 542 796 305 198 062 033 458 301 994 356 697 920 971 464 679 025 651 347 605 210 311 381 810 355 030 442 303 149 884 732 570 354 955 586
757 749 990 658 488 290 246 800 442 880 840 585 828 448 833 120 596 471 234 130 859 375 000 000 000 $a^9 x^9$ +
99 793 099 313 933 828 386 860 329 362 094 700 637 897 235 377 588 478 633 461 676 686 696 322 077 176 669 565 933 633 322 355 482 890 948 151 119
785 713 396 046 503 833 028 613 607 699 103 412 233 222 201 961 568 688 964 843 750 000 000 000 $a^{10} x^{10}$ +
8 677 660 809 907 289 424 944 376 466 269 104 403 295 411 771 964 215 533 344 493 624 930 114 963 232 753 875 298 576 810 639 607 207 908 534 879
981 366 382 264 913 376 785 096 835 452 095 948 889 845 408 866 223 364 257 812 500 000 000 000 $a^{11} x^{11}$ +
694 212 864 792 583 153 995 550 117 301 528 352 263 632 941 757 137 242 667 559 489 994 409 197 058 620 310 023 886 144 851 168 576 632 682 790 398
509 310 581 193 070 142 807 746 836 167 675 911 187 632 709 297 869 140 625 000 000 000 000 $a^{12} x^{12}$ +
51 423 175 169 820 974 370 040 749 429 742 840 908 417 254 944 973 129 086 485 888 147 734 014 596 934 837 779 547 121 840 827 301 972 791 317 807
296 985 968 977 264 455 022 796 061 938 346 363 791 676 496 985 027 343 750 000 000 000 000 $a^{13} x^{13}$ +
3 546 425 873 780 756 853 106 258 581 361 575 235 063 258 961 722 284 764 585 233 665 360 966 523 926 540 536 520 491 161 436 365 653 295 952 952
227 378 342 688 087 203 794 675 590 478 506 645 778 736 310 136 898 437 500 000 000 000 000 $a^{14} x^{14}$ +
228 801 669 276 177 861 490 726 360 087 843 563 552 468 320 111 115 146 102 273 139 700 707 517 672 680 034 614 225 236 221 701 009 890 061 480 788
863 118 883 102 400 244 817 780 030 871 396 501 853 955 492 703 125 000 000 000 000 000 $a^{15} x^{15}$ +
13 866 767 834 919 870 393 377 355 156 839 003 851 664 746 673 400 917 945 592 311 497 012 576 828 647 274 825 104 559 771 012 182 417 579 483 684
173 522 356 551 660 620 898 047 274 598 266 454 657 815 484 406 250 000 000 000 000 000 $a^{16} x^{16}$ +
792 386 733 423 992 593 907 277 437 533 657 362 952 271 238 480 052 454 033 846 371 257 861 533 065 558 561 434 546 272 629 267 566 718 827 639 095
629 848 945 809 178 337 031 272 834 186 654 551 875 170 537 500 000 000 000 000 000 $a^{17} x^{17}$ +
42 831 715 320 215 815 886 879 861 488 305 803 402 825 472 350 273 105 623 451 155 203 127 650 435 976 138 455 921 420 142 122 571 173 990 683 194
358 370 213 286 982 612 812 501 234 280 359 705 506 765 975 000 000 000 000 000 000 $a^{18} x^{18}$ +
2 196 498 221 549 529 019 839 992 896 836 195 046 298 742 171 808 877 211 459 033 600 160 392 330 050 058 382 354 944 622 672 952 367 896 958 112
531 198 472 476 255 518 605 769 294 065 659 472 077 270 050 000 000 000 000 000 000 $a^{19} x^{19}$ +
107 146 254 709 733 122 919 024 043 748 107 075 429 206 935 210 189 132 266 294 321 959 043 528 295 124 799 139 265 591 349 900 115 507 168 688 416
156 023 047 622 220 419 793 624 100 763 876 686 696 100 000 000 000 000 000 000 $a^{20} x^{20}$ +
4 983 546 730 685 261 531 117 397 383 632 887 229 265 438 846 985 541 035 641 596 370 188 071 083 494 176 704 151 887 969 762 796 070 100 869 228
658 419 676 633 591 647 432 261 586 082 040 776 125 400 000 000 000 000 000 000 $a^{21} x^{21}$ +
221 490 965 808 233 845 827 439 883 717 017 210 189 575 059 866 024 046 028 515 394 230 580 937 044 185 631 295 639 465 322 790 936 448 927 521 273
707 541 183 715 184 330 322 737 159 201 812 272 240 000 000 000 000 000 000 $a^{22} x^{22}$ +
9 425 147 481 201 440 247 976 165 264 553 923 837 854 257 866 639 321 107 596 399 754 492 805 831 667 473 672 154 870 864 799 614 316 975 639 203
136 491 114 200 646 141 715 861 155 710 715 415 840 000 000 000 000 000 000 $a^{23} x^{23}$ +
384 699 897 191 895 520 325 557 765 900 160 156 647 112 565 985 278 412 554 955 092 020 114 523 741 529 537 638 974 321 012 229 155 794 924 049 107
611 882 212 271 271 090 443 312 477 988 384 320 000 000 000 000 000 000 $a^{24} x^{24}$ +
15 086 270 478 113 549 816 688 539 839 221 966 927 337 747 685 697 192 649 213 925 177 259 393 087 903 119 123 097 032 196 558 006 109 604 864 670
886 740 478 912 598 866 291 894 606 979 936 640 000 000 000 000 000 000 $a^{25} x^{25}$ +
569 293 225 589 190 559 120 322 258 083 847 808 578 782 931 535 743 118 838 261 327 443 750 682 562 381 853 701 774 799 870 113 438 098 296 780 033
461 904 864 626 372 312 901 683 282 261 760 000 000 000 000 000 000 $a^{26} x^{26}$ +
20 701 571 839 606 929 422 557 173 021 230 829 402 864 833 874 027 022 503 209 502 816 136 388 456 813 885 589 155 447 268 004 125 021 756 246 546
671 341 995 077 322 629 560 061 210 264 064 000 000 000 000 000 000 $a^{27} x^{27}$ +

726 370 941 740 594 014 826 567 474 429 151 908 872 450 311 369 369 210 638 929 923 373 206 612 519 785 459 268 612 184 842 250 000 763 377 071 813
029 543 686 923 601 037 195 130 184 704 000 000 000 000 000 000 $a^{28} x^{28}$ +
24 622 743 787 816 746 265 307 372 014 547 522 334 659 332 588 792 176 631 828 132 995 701 919 068 467 303 704 020 752 028 550 847 483 504 307 519
085 747 243 624 528 848 718 478 989 312 000 000 000 000 000 000 $a^{29} x^{29}$ +
807 303 075 010 385 123 452 700 721 788 443 355 234 732 216 025 973 004 322 233 868 711 538 330 113 682 088 656 418 099 296 749 097 819 813 361 281
499 909 627 033 732 744 868 163 584 000 000 000 000 000 000 $a^{30} x^{30}$ +
25 628 669 047 948 734 077 863 514 977 410 900 166 181 975 111 935 650 930 864 567 260 683 756 511 545 463 131 949 780 930 055 526 914 914 709 881
952 378 083 397 896 277 614 862 336 000 000 000 000 000 000 $a^{31} x^{31}$ +
788 574 432 244 576 433 165 031 230 074 181 543 574 830 003 444 173 874 795 832 838 790 269 431 124 475 788 675 377 874 770 939 289 689 683 380 983
150 094 873 781 423 926 611 148 800 000 000 000 000 000 $a^{32} x^{32}$ +
23 539 535 290 882 878 601 941 230 748 483 031 151 487 462 789 378 324 620 771 129 516 127 445 705 208 232 497 772 473 873 759 381 781 781 593 462
183 584 921 605 415 639 600 332 800 000 000 000 000 000 $a^{33} x^{33}$ +
682 305 370 750 228 365 273 658 862 274 870 468 159 056 892 445 748 539 732 496 507 713 839 005 948 064 710 080 361 561 558 242 950 196 567 926 440
103 910 771 171 467 814 502 400 000 000 000 000 000 $a^{34} x^{34}$ +
19 219 869 598 597 982 120 384 756 683 799 168 117 156 532 181 570 381 400 915 394 583 488 422 702 762 386 199 446 804 550 936 421 132 297 688 068
735 321 430 173 844 163 788 800 000 000 000 000 000 $a^{35} x^{35}$ +
526 571 769 824 602 249 873 554 977 638 333 373 072 781 703 604 667 983 586 723 139 273 655 416 514 037 978 067 035 741 121 545 784 446 512 001 883
159 491 237 639 566 131 200 000 000 000 000 000 $a^{36} x^{36}$ +
14 041 913 861 989 393 329 961 466 070 355 556 615 274 178 762 791 146 228 979 283 713 964 144 440 374 346 081 787 619 763 241 220 918 573 653 383
550 919 766 337 055 096 832 000 000 000 000 000 $a^{37} x^{37}$ +
364 725 035 376 347 878 700 297 820 009 235 236 760 368 279 553 016 785 168 293 083 479 588 167 282 450 547 578 899 214 629 642 101 781 133 854 118
205 708 216 546 885 632 000 000 000 000 000 $a^{38} x^{38}$ +
9 233 545 199 401 212 118 994 881 519 221 145 234 439 703 279 823 209 751 096 027 429 862 991 576 770 899 938 706 309 231 130 179 791 927 439 344
764 701 473 836 630 016 000 000 000 000 000 $a^{39} x^{39}$ +
227 988 770 355 585 484 419 626 704 178 299 882 331 844 525 427 733 574 101 136 479 749 703 495 722 738 270 091 513 808 176 053 822 022 899 736 907
770 406 761 398 272 000 000 000 000 000 $a^{40} x^{40}$ +
5 493 705 309 773 144 202 882 571 185 019 274 273 056 494 588 620 086 122 918 951 319 269 963 752 355 139 038 349 730 317 495 272 819 828 909 323
078 804 982 202 368 000 000 000 000 000 $a^{41} x^{41}$ +
129 263 654 347 603 393 009 001 674 941 629 982 895 446 931 496 943 202 892 210 619 276 940 323 584 826 800 902 346 595 705 771 125 172 444 925 248
913 058 404 761 600 000 000 000 000 $a^{42} x^{42}$ +
2 971 578 260 864 445 816 298 889 079 117 930 641 274 642 103 378 004 664 188 749 868 435 409 737 582 225 308 099 921 740 362 554 601 665 400 580
434 782 951 833 600 000 000 000 000 $a^{43} x^{43}$ +
66 777 039 569 987 546 433 682 900 654 335 520 028 643 642 772 539 430 655 926 963 335 627 185 114 207 310 294 380 263 828 372 013 520 570 799 560
332 201 164 800 000 000 000 000 $a^{44} x^{44}$ +
1 467 627 243 296 429 591 949 074 739 655 725 714 915 244 896 099 767 706 723 669 523 859 938 134 378 182 643 832 533 270 953 231 066 386 171 418
908 400 025 600 000 000 000 000 $a^{45} x^{45}$ +
31 561 876 199 923 217 031 162 897 627 004 854 084 198 814 969 887 477 563 949 882 233 547 056 653 294 250 405 000 715 504 370 560 567 444 546 643
191 398 400 000 000 000 000 $a^{46} x^{46}$ +
664 460 551 577 330 884 866 587 318 463 260 085 983 132 946 734 473 211 872 629 099 653 622 245 332 510 534 842 120 326 407 801 275 104 095 718 804
029 440 000 000 000 000 $a^{47} x^{47}$ +
13 700 217 558 295 482 162 197 676 669 345 568 783 157 380 345 040 684 780 878 950 508 322 108 151 185 784 223 548 872 709 439 201 548 538 056 057
815 040 000 000 000 000 $a^{48} x^{48}$ +
276 772 071 884 757 215 397 932 862 006 981 187 538 532 936 263 448 177 391 493 949 663 072 891 943 147 156 031 290 357 766 448 516 132 081 940 561
920 000 000 000 000 $a^{49} x^{49}$ +

5 480 635 086 826 875 552 434 314 099 148 142 327 495 701 708 187 092 621 613 741 577 486 591 919 666 280 317 451 294 213 197 000 319 447 167 139 840 000 000 000 000 $a^{50} x^{50}$ +

106 420 098 773 337 389 367 656 584 449 478 491 796 033 042 877 419 274 206 092 069 465 759 066 401 286 996 455 364 936 178 582 530 474 702 274 560 000 000 000 000 $a^{51} x^{51}$ +

2 027 049 500 444 521 702 241 077 799 037 685 558 019 677 007 188 938 556 306 515 608 871 601 264 786 418 980 102 189 260 544 429 151 899 090 944 000 000 000 000 $a^{52} x^{52}$ +

37 888 775 709 243 396 303 571 547 645 564 216 037 750 972 096 989 505 725 355 431 941 525 257 285 727 457 572 003 537 580 269 703 773 814 784 000 000 000 000 $a^{53} x^{53}$ +

695 206 893 747 585 253 276 542 158 634 205 798 857 816 001 779 623 958 263 402 420 945 417 564 875 733 166 458 780 506 059 994 564 657 152 000 000 000 000 $a^{54} x^{54}$ +

12 526 250 337 794 328 887 865 624 479 895 599 979 420 108 140 173 404 653 394 638 215 232 748 916 679 876 873 131 180 289 369 271 435 264 000 000 000 000 $a^{55} x^{55}$ +

221 703 545 801 669 537 838 329 636 812 311 504 060 532 887 436 697 427 493 710 410 889 075 202 065 130 564 126 215 580 342 818 963 456 000 000 000 000 $a^{56} x^{56}$ +

3 855 713 840 029 035 440 666 602 379 344 547 896 704 919 781 507 781 347 716 702 798 070 873 079 393 575 028 282 010 092 918 590 668 800 000 000 000 $a^{57} x^{57}$ +

65 909 638 291 094 622 917 377 818 450 334 152 080 425 979 171 073 185 431 054 748 684 972 189 391 343 162 876 615 557 143 907 532 800 000 000 000 $a^{58} x^{58}$ +

1 107 725 013 295 707 948 191 223 839 501 414 320 679 428 221 362 574 545 059 743 675 377 683 855 316 691 813 052 362 304 939 622 400 000 000 000 $a^{59} x^{59}$ +

18 309 504 351 995 172 697 375 600 652 915 939 184 783 937 543 183 050 331 566 011 163 267 501 740 771 765 504 997 724 048 588 800 000 000 000 $a^{60} x^{60}$ +

297 715 517 918 620 694 266 269 929 315 706 328 207 868 903 141 187 810 269 366 035 175 081 329 118 240 089 512 158 114 611 200 000 000 000 $a^{61} x^{61}$ +

4 763 448 286 697 931 108 260 318 869 051 301 251 325 902 450 259 004 964 309 856 562 801 301 265 891 841 432 194 529 833 779 200 000 000 $a^{62} x^{62}$ +

75 014 933 648 786 316 665 516 832 583 485 059 075 998 463 783 606 377 390 706 402 563 800 019 935 304 589 483 378 422 579 200 000 000 $a^{63} x^{63}$ +

1 163 022 227 112 966 149 852 974 148 581 163 706 604 627 345 482 269 416 910 176 783 934 884 030 004 722 317 571 758 489 600 000 000 $a^{64} x^{64}$ +

17 756 064 536 075 819 081 724 796 161 544 484 070 299 654 129 500 296 441 376 744 792 898 992 824 499 577 367 507 763 200 000 000 $a^{65} x^{65}$ +

267 008 489 264 298 031 304 132 273 105 932 091 282 701 565 857 147 314 907 920 974 329 308 162 774 429 734 849 740 800 000 000 $a^{66} x^{66}$ +

3 955 681 322 434 044 908 209 367 008 976 771 722 706 689 864 550 330 591 228 458 878 952 713 522 584 144 219 996 160 000 000 $a^{67} x^{67}$ +

57 747 172 590 278 027 857 071 051 225 938 273 324 185 253 497 085 118 120 123 487 283 981 219 307 797 725 839 360 000 000 $a^{68} x^{68}$ +

830 894 569 644 288 170 605 338 866 560 262 925 527 845 374 058 778 677 987 388 306 244 334 090 759 679 508 480 000 000 $a^{69} x^{69}$ +

11 785 738 576 514 725 824 189 203 780 996 637 241 529 721 617 855 016 709 040 968 882 898 355 897 300 418 560 000 000 $a^{70} x^{70}$ +

164 835 504 566 639 522 016 632 220 713 239 681 699 716 386 263 706 527 399 174 389 970 606 376 186 019 840 000 000 $a^{71} x^{71}$ +

2 273 593 166 436 407 200 229 409 940 872 271 471 720 226 017 430 434 860 678 267 447 870 432 774 979 584 000 000 $a^{72} x^{72}$ +

30 933 240 359 679 009 526 930 747 494 860 836 349 935 047 856 196 392 662 289 353 032 250 786 054 144 000 000 $a^{73} x^{73}$ +

$$415\,211\,279\,995\,691\,403\,046\,050\,301\,944\,440\,756\,374\,967\,085\,318\,072\,384\,728\,716\,148\,083\,903\,168\,512\,000\,000\, a^{74}\, x^{74} +$$
$$5\,499\,487\,152\,260\,813\,285\,378\,149\,694\,628\,354\,389\,072\,411\,726\,067\,183\,903\,691\,604\,610\,382\,823\,424\,000\,000\, a^{75}\, x^{75} +$$
$$71\,888\,720\,944\,585\,794\,580\,106\,531\,955\,926\,201\,164\,345\,251\,321\,139\,658\,871\,785\,681\,181\,474\,816\,000\,000\, a^{76}\, x^{76} +$$
$$927\,596\,399\,284\,977\,994\,582\,019\,767\,173\,241\,305\,346\,390\,339\,627\,608\,501\,571\,428\,144\,277\,094\,400\,000\, a^{77}\, x^{77} +$$
$$11\,816\,514\,640\,572\,968\,083\,847\,385\,569\,085\,876\,501\,227\,902\,415\,638\,324\,860\,782\,524\,130\,918\,400\,000\, a^{78}\, x^{78} +$$
$$148\,635\,404\,283\,936\,705\,457\,199\,818\,479\,067\,628\,946\,262\,923\,467\,148\,740\,387\,201\,561\,395\,200\,000\, a^{79}\, x^{79} +$$
$$1\,846\,402\,537\,688\,654\,726\,176\,395\,260\,609\,535\,763\,307\,613\,956\,113\,648\,948\,909\,336\,166\,400\,000\, a^{80}\, x^{80} +$$
$$22\,655\,245\,861\,210\,487\,437\,747\,181\,111\,773\,444\,948\,559\,680\,443\,112\,257\,041\,832\,345\,600\,000\, a^{81}\, x^{81} +$$
$$274\,609\,040\,741\,945\,302\,275\,723\,407\,415\,435\,696\,346\,177\,944\,764\,997\,055\,052\,513\,280\,000\, a^{82}\, x^{82} +$$
$$3\,288\,731\,026\,849\,644\,338\,631\,418\,052\,879\,469\,417\,319\,496\,344\,490\,982\,695\,239\,680\,000\, a^{83}\, x^{83} +$$
$$38\,919\,893\,808\,871\,530\,634\,691\,337\,903\,899\,046\,358\,810\,607\,627\,112\,221\,245\,440\,000\, a^{84}\, x^{84} +$$
$$455\,203\,436\,361\,070\,533\,739\,079\,975\,484\,199\,372\,617\,667\,925\,463\,300\,833\,280\,000\, a^{85}\, x^{85} +$$
$$5\,262\,467\,472\,382\,318\,309\,122\,311\,855\,308\,663\,267\,256\,276\,594\,951\,454\,720\,000\, a^{86}\, x^{86} +$$
$$60\,142\,485\,398\,655\,066\,389\,969\,278\,346\,384\,723\,054\,357\,446\,799\,445\,196\,800\, a^{87}\, x^{87} +$$
$$679\,576\,106\,199\,492\,275\,592\,873\,201\,654\,064\,667\,280\,875\,105\,078\,476\,800\, a^{88}\, x^{88} +$$
$$7\,593\,029\,119\,547\,399\,727\,294\,672\,644\,179\,493\,489\,171\,788\,883\,558\,400\, a^{89}\, x^{89} +$$
$$83\,900\,874\,249\,142\,538\,423\,145\,554\,079\,331\,419\,769\,854\,020\,812\,800\, a^{90}\, x^{90} +$$
$$916\,949\,445\,345\,820\,092\,056\,235\,563\,708\,540\,106\,774\,360\,883\,200\, a^{91}\, x^{91} + 9\,912\,966\,976\,711\,568\,562\,770\,114\,202\,254\,487\,640\,803\,901\,440\, a^{92}\, x^{92} +$$
$$106\,021\,037\,184\,080\,947\,195\,402\,290\,933\,203\,076\,372\,234\,240\, a^{93}\, x^{93} + 1\,121\,915\,737\,397\,681\,980\,903\,727\,946\,383\,101\,337\,272\,320\, a^{94}\, x^{94} +$$
$$11\,747\,808\,768\,562\,114\,983\,285\,109\,386\,210\,485\,207\,040\, a^{95}\, x^{95} + 121\,738\,950\,969\,555\,595\,681\,710\,978\,095\,445\,442\,560\, a^{96}\, x^{96} +$$
$$1\,248\,604\,625\,328\,775\,340\,325\,240\,800\,978\,927\,616\, a^{97}\, x^{97} + 12\,676\,189\,089\,632\,236\,957\,616\,657\,877\,958\,656\, a^{98}\, x^{98} +$$
$$127\,398\,885\,322\,937\,054\,850\,418\,672\,140\,288\, a^{99}\, x^{99} + 1\,267\,650\,600\,228\,229\,401\,496\,703\,205\,376\, a^{100}\, x^{100}\Big) +$$
$$1\,339\,928\,042\,684\,663\,702\,626\,654\,216\,353\,741\,866\,828\,222\,367\,324\,552\,136\,009\,000\,175\,903\,930\,373\,973\,956\,200\,201\,339\,808\,971\,908\,813\,302\,485\,337\,859\,\backslash$$
$$343\,555\,595\,880\,232\,757\,068\,702\,494\,068\,539\,027\,184\,400\,769\,291\,974\,725\,364\,464\,819\,431\,304\,931\,640\,625\, e^{a x} \sqrt{\pi}\, \text{Erf}\left[\sqrt{a x}\right]\Big)\Big) +$$
$$\frac{1}{101} x^{101}\, \text{Gamma}\left[\frac{1}{2}, a x\right]$$

Problem 61: Result more than twice size of optimal antiderivative.

$$\int x^2\, \text{Gamma}\left[\frac{1}{2}, a x\right] dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{1}{3} x^3\, \text{Gamma}\left[\frac{1}{2}, a x\right] - \frac{\text{Gamma}\left[\frac{7}{2}, a x\right]}{3 a^3}$$

Result (type 4, 67 leaves):

$$\frac{1}{24}\left(-\frac{2 e^{-a x} \sqrt{a x}\, \left(15 + 10 a x + 4 a^2 x^2\right)}{a^3} + \frac{15 \sqrt{\pi}\, \text{Erf}\left[\sqrt{a x}\right]}{a^3} + 8 x^3\, \text{Gamma}\left[\frac{1}{2}, a x\right]\right)$$

Problem 63: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}\left[\frac{1}{2}, a x\right] dx$$

Optimal (type 4, 22 leaves, 1 step):

$$x \,\text{Gamma}\left[\frac{1}{2}, a x\right] - \frac{\text{Gamma}\left[\frac{3}{2}, a x\right]}{a}$$

Result (type 4, 50 leaves):

$$\frac{2 \left(-\frac{1}{2} e^{-a x} \sqrt{a x} + \frac{1}{4} \sqrt{\pi} \,\text{Erf}\left[\sqrt{a x}\right]\right)}{a} + x \,\text{Gamma}\left[\frac{1}{2}, a x\right]$$

Problem 65: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}\left[\frac{1}{2}, a x\right]}{x^2} dx$$

Optimal (type 4, 22 leaves, 1 step):

$$a \,\text{Gamma}\left[-\frac{1}{2}, a x\right] - \frac{\text{Gamma}\left[\frac{1}{2}, a x\right]}{x}$$

Result (type 4, 47 leaves):

$$-2 a \left(-\frac{e^{-a x}}{\sqrt{a x}} - \sqrt{\pi} \,\text{Erf}\left[\sqrt{a x}\right]\right) - \frac{\text{Gamma}\left[\frac{1}{2}, a x\right]}{x}$$

Problem 67: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}\left[\frac{1}{2}, a x\right]}{x^4} dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{1}{3} a^3 \,\text{Gamma}\left[-\frac{5}{2}, a x\right] - \frac{\text{Gamma}\left[\frac{1}{2}, a x\right]}{3 x^3}$$

Result (type 4, 67 leaves):

$$\frac{2\, e^{-a x} \sqrt{a x}\, \left(3-2 a x+4 a^2 x^2\right)+8 a^3 \sqrt{\pi}\, x^3\, \text{Erf}\left[\sqrt{a x}\right]-15\, \text{Gamma}\left[\frac{1}{2}, a x\right]}{45 x^3}$$

Problem 68: Result more than twice size of optimal antiderivative.

$$\int x^{100}\, \text{Gamma}\left[\frac{3}{2}, a x\right] dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{1}{101} x^{101}\, \text{Gamma}\left[\frac{3}{2}, a x\right]-\frac{\text{Gamma}\left[\frac{205}{2}, a x\right]}{101\, a^{101}}$$

Result (type 4, 864 leaves):

$$\begin{aligned}
&\frac{1}{512\,130\,842\,492\,204\,678\,204\,668\,094\,971\,904\, a^{101}} e^{-a x} \Big(-2 \sqrt{a x} \\
&\big(272\,005\,392\,664\,986\,731\,633\,210\,805\,919\,809\,598\,966\,129\,140\,566\,884\,083\,609\,827\,035\,708\,497\,865\,916\,713\,108\,640\,871\,981\,221\,297\,489\,100\,404\,523\,585 \\
&446\,741\,785\,963\,687\,249\,684\,946\,606\,295\,913\,422\,518\,433\,356\,166\,270\,869\,248\,986\,358\,344\,554\,901\,123\,046\,875 + \\
&181\,336\,928\,443\,324\,487\,755\,473\,870\,613\,206\,399\,310\,752\,760\,377\,922\,722\,406\,551\,357\,138\,998\,577\,277\,808\,739\,093\,914\,654\,147\,531\,659\,400\,269\,682\,390 \\
&297\,827\,857\,309\,124\,833\,123\,297\,737\,530\,608\,948\,345\,622\,237\,444\,180\,579\,499\,324\,238\,896\,369\,934\,082\,031\,250\, a x + \\
&72\,534\,771\,377\,329\,795\,102\,189\,548\,245\,282\,559\,724\,301\,104\,151\,169\,088\,962\,620\,542\,855\,599\,430\,911\,123\,495\,637\,565\,861\,659\,012\,663\,760\,107\,872\,956 \\
&119\,131\,142\,923\,649\,933\,249\,319\,095\,012\,243\,579\,338\,248\,894\,977\,672\,231\,799\,729\,695\,558\,547\,973\,632\,812\,500\, a^2 x^2 + \\
&20\,724\,220\,393\,522\,798\,600\,625\,585\,212\,937\,874\,206\,943\,172\,614\,619\,739\,703\,605\,869\,387\,314\,123\,117\,463\,855\,896\,447\,389\,045\,432\,189\,645\,745\,106\,558 \\
&891\,180\,326\,549\,614\,266\,642\,662\,598\,574\,926\,736\,953\,785\,398\,565\,049\,209\,085\,637\,055\,873\,870\,849\,609\,375\,000\, a^3 x^3 + \\
&4\,605\,382\,309\,671\,733\,022\,361\,241\,158\,430\,638\,712\,654\,038\,358\,804\,386\,600\,801\,304\,308\,292\,027\,359\,436\,412\,421\,432\,753\,121\,207\,153\,254\,610\,023\,679 \\
&753\,595\,628\,122\,136\,503\,698\,369\,466\,349\,983\,719\,323\,063\,421\,903\,344\,268\,685\,697\,123\,527\,526\,855\,468\,750\,000\, a^4 x^4 + \\
&837\,342\,238\,122\,133\,276\,792\,952\,937\,896\,479\,765\,937\,097\,883\,418\,979\,381\,963\,873\,510\,598\,550\,428\,988\,438\,622\,078\,682\,385\,674\,027\,864\,474\,549\,759\,955 \\
&199\,205\,113\,115\,727\,945\,158\,084\,790\,906\,130\,786\,011\,531\,255\,153\,503\,397\,399\,477\,005\,004\,882\,812\,500\,000\, a^5 x^5 + \\
&128\,821\,882\,788\,020\,504\,121\,992\,759\,676\,381\,502\,451\,861\,212\,833\,689\,135\,686\,749\,770\,861\,315\,450\,613\,605\,941\,858\,258\,828\,565\,235\,056\,073\,007\,655\,377 \\
&722\,954\,632\,787\,035\,068\,485\,859\,198\,600\,943\,197\,847\,927\,885\,408\,231\,291\,907\,611\,846\,923\,828\,125\,000\,000\, a^6 x^6 + \\
&17\,176\,251\,038\,402\,733\,882\,932\,367\,956\,850\,866\,993\,581\,495\,044\,491\,884\,758\,233\,302\,781\,508\,726\,748\,480\,792\,247\,767\,843\,808\,698\,007\,476\,401\,020\,717 \\
&029\,727\,284\,371\,604\,675\,798\,114\,559\,813\,459\,093\,046\,390\,384\,721\,097\,505\,587\,681\,579\,589\,843\,750\,000\,000\, a^7 x^7 + \\
&2\,020\,735\,416\,282\,674\,574\,462\,631\,524\,335\,396\,116\,891\,940\,593\,469\,633\,500\,968\,623\,856\,648\,085\,499\,821\,269\,676\,207\,981\,624\,552\,706\,761\,929\,531\,849 \\
&062\,320\,856\,984\,894\,667\,740\,954\,654\,095\,701\,069\,770\,163\,574\,673\,070\,294\,775\,021\,362\,304\,687\,500\,000\,000\, a^8 x^8 + \\
&212\,708\,991\,187\,649\,955\,206\,592\,792\,035\,304\,854\,409\,677\,957\,207\,329\,842\,207\,223\,563\,857\,693\,210\,507\,502\,071\,179\,787\,539\,426\,600\,711\,782\,055\,984\,111 \\
&823\,248\,103\,673\,122\,920\,100\,489\,904\,810\,638\,923\,175\,113\,123\,481\,083\,660\,528\,564\,453\,125\,000\,000\,000\, a^9 x^9 + \\
&20\,257\,999\,160\,728\,567\,162\,532\,646\,860\,505\,224\,229\,493\,138\,781\,650\,461\,162\,592\,720\,367\,399\,353\,381\,666\,863\,921\,884\,527\,564\,438\,163\,026\,862\,474\,677 \\
&316\,499\,819\,397\,440\,278\,104\,808\,562\,362\,917\,992\,683\,344\,106\,998\,198\,443\,859\,863\,281\,250\,000\,000\,000\, a^{10} x^{10} + \\
&1\,761\,565\,144\,411\,179\,753\,263\,708\,422\,652\,628\,193\,868\,968\,589\,708\,735\,753\,268\,932\,205\,860\,813\,337\,536\,249\,036\,685\,611\,092\,559\,840\,263\,205\,432\,580 \\
&636\,217\,375\,599\,777\,415\,487\,374\,657\,596\,775\,477\,624\,638\,617\,999\,843\,342\,944\,335\,937\,500\,000\,000\,000\, a^{11} x^{11} + \\
&140\,925\,211\,552\,894\,380\,261\,096\,673\,812\,210\,255\,509\,517\,487\,176\,698\,860\,261\,514\,576\,468\,865\,067\,002\,899\,922\,934\,848\,887\,404\,787\,221\,056\,434\,606\,450 \\
&897\,390\,047\,982\,193\,238\,989\,972\,607\,742\,038\,209\,971\,089\,439\,987\,467\,435\,546\,875\,000\,000\,000\,000\, a^{12} x^{12} + \\
&10\,438\,904\,559\,473\,657\,797\,118\,272\,134\,237\,796\,704\,408\,702\,753\,829\,545\,204\,556\,635\,293\,990\,004\,963\,177\,772\,069\,248\,065\,733\,687\,942\,300\,476\,637\,514
\end{aligned}$$

881 288 151 702 384 684 369 627 600 573 484 311 849 710 328 887 960 550 781 250 000 000 000 000 $a^{13} x^{13}$ +
719 924 452 377 493 641 180 570 492 016 399 772 717 841 569 229 623 807 210 802 434 068 276 204 357 087 728 913 659 705 771 582 227 619 078 449 302
157 803 565 681 702 370 319 144 867 136 849 093 083 470 957 790 382 812 500 000 000 000 000 $a^{14} x^{14}$ +
46 446 738 863 064 105 882 617 451 097 832 243 401 151 068 982 556 374 658 761 447 359 243 626 087 554 047 026 687 722 953 005 305 007 682 480 600
139 213 133 269 787 249 698 009 346 266 893 489 876 352 965 018 734 375 000 000 000 000 000 $a^{15} x^{15}$ +
2 814 953 870 488 733 689 855 603 096 838 317 781 887 943 574 700 386 342 955 239 233 893 553 096 215 396 789 496 225 633 515 473 030 768 635 187
887 225 038 379 987 106 042 303 596 743 448 090 295 536 543 334 468 750 000 000 000 000 000 $a^{16} x^{16}$ +
160 854 506 885 070 496 563 177 319 819 332 444 679 311 061 411 450 648 168 870 813 365 345 891 212 308 387 971 212 893 343 741 316 043 922 010 736
412 859 335 999 263 202 417 348 385 339 890 874 030 659 619 112 500 000 000 000 000 000 $a^{17} x^{17}$ +
8 694 838 210 003 810 625 036 611 882 126 078 090 773 570 887 105 440 441 560 584 506 234 913 038 503 156 106 552 048 288 850 881 948 320 108 688
454 749 153 297 257 470 400 937 750 558 913 020 217 873 492 925 000 000 000 000 000 000 $a^{18} x^{18}$ +
445 889 138 974 554 391 027 518 558 057 747 594 398 644 660 877 202 073 926 183 820 832 559 643 000 161 851 618 053 758 402 609 330 683 082 496 843
833 289 912 679 870 276 971 166 695 328 872 831 685 820 150 000 000 000 000 000 000 $a^{19} x^{19}$ +
21 750 689 706 075 823 952 561 880 880 865 736 312 129 007 847 668 393 850 057 747 357 685 836 243 910 334 225 270 915 044 029 723 447 955 243 748
479 672 678 667 310 745 218 105 692 455 066 967 399 308 300 000 000 000 000 000 000 $a^{20} x^{20}$ +
1 011 659 986 329 108 090 816 831 668 877 476 107 540 884 085 938 064 830 235 244 063 148 178 429 949 317 870 942 833 257 861 847 602 230 476 453
417 659 194 356 619 104 428 749 101 974 654 277 553 456 200 000 000 000 000 000 000 $a^{21} x^{21}$ +
44 962 666 059 071 470 702 970 296 394 554 493 668 483 737 152 802 881 343 788 625 028 807 930 219 969 683 153 014 811 460 526 560 099 132 286 818
562 630 860 294 182 419 055 515 643 317 967 891 264 720 000 000 000 000 000 000 $a^{22} x^{22}$ +
1 913 304 938 683 892 370 339 161 548 704 446 539 084 414 346 927 782 184 842 069 150 162 039 583 828 497 155 447 438 785 554 321 706 346 054 758
236 707 696 182 731 166 768 319 814 609 275 229 415 520 000 000 000 000 000 000 $a^{23} x^{23}$ +
78 094 079 129 954 790 626 088 226 477 732 511 799 363 850 895 011 517 748 655 883 680 083 248 319 530 496 140 711 787 165 482 518 626 369 581 968
845 212 089 091 068 031 359 992 433 031 642 016 960 000 000 000 000 000 000 $a^{24} x^{24}$ +
3 062 512 907 057 050 612 787 773 587 362 059 286 249 562 780 196 530 107 790 426 810 983 656 796 844 333 181 988 697 535 901 275 240 249 787 528
190 008 317 219 257 569 857 254 605 216 927 137 920 000 000 000 000 000 000 $a^{25} x^{25}$ +
115 566 524 794 605 683 501 425 418 391 021 105 141 492 935 101 755 853 124 167 049 471 081 388 560 163 516 301 460 284 373 633 027 933 954 246 346
792 766 687 519 153 579 519 041 706 299 137 280 000 000 000 000 000 000 $a^{26} x^{26}$ +
4 202 419 083 440 206 672 779 106 123 309 858 368 781 561 276 427 485 568 151 529 071 675 686 856 733 218 774 598 555 795 404 837 379 416 518 048
974 282 425 000 696 493 800 692 425 683 604 992 000 000 000 000 000 000 $a^{27} x^{27}$ +
147 453 301 173 340 585 009 793 197 309 117 837 501 107 413 207 981 949 759 702 774 444 760 942 341 516 448 231 528 273 522 976 750 154 965 545 578
044 997 368 445 491 010 550 611 427 494 912 000 000 000 000 000 000 $a^{28} x^{28}$ +
4 998 416 988 926 799 491 857 396 518 953 147 033 935 844 515 524 811 856 261 110 998 127 489 570 898 862 651 916 212 661 795 822 039 151 374 426
374 406 690 455 779 356 289 851 234 830 336 000 000 000 000 000 000 $a^{29} x^{29}$ +
163 882 524 227 108 180 060 898 246 523 054 001 112 650 639 853 272 519 877 413 475 348 442 281 013 077 463 997 252 874 157 240 066 857 422 112 340
144 481 654 287 847 747 208 237 207 552 000 000 000 000 000 000 $a^{30} x^{30}$ +
5 202 619 816 733 593 017 806 293 540 414 412 733 734 940 947 722 937 138 965 507 153 918 802 571 843 729 015 785 805 528 801 271 963 727 686 106
036 332 750 929 772 944 355 817 054 208 000 000 000 000 000 000 $a^{31} x^{31}$ +
160 080 609 745 649 015 932 501 339 705 058 853 345 690 490 699 167 296 583 554 066 274 424 694 518 268 585 101 101 708 578 500 675 807 005 726 339
579 469 259 377 629 057 102 063 206 400 000 000 000 000 000 $a^{32} x^{32}$ +
4 778 525 664 049 224 356 194 069 841 942 055 323 751 954 946 243 799 898 016 539 291 773 871 478 157 271 197 047 812 196 373 154 501 701 663 472
823 267 739 085 899 374 838 867 558 400 000 000 000 000 000 $a^{33} x^{33}$ +
138 507 990 262 296 358 150 552 749 041 798 705 036 288 549 166 486 953 565 696 791 065 909 318 207 457 136 146 313 396 996 323 318 889 903 289 067
341 093 886 547 807 966 343 987 200 000 000 000 000 000 $a^{34} x^{34}$ +
3 901 633 528 515 390 370 438 105 606 811 231 127 782 776 032 858 787 424 385 825 100 448 149 808 660 764 398 487 701 323 840 093 489 856 430 677

953 270 250 325 290 365 249 126 400 000 000 000 000 000 a^{35} x^{35} +
106 894 069 274 394 256 724 331 660 460 581 674 733 774 685 831 747 600 668 104 797 272 552 049 552 349 709 547 608 255 447 673 794 242 641 936 382
281 376 721 240 831 924 633 600 000 000 000 000 000 a^{36} x^{36} +
2 850 508 513 983 846 845 982 177 612 282 177 992 900 658 288 846 602 684 482 794 593 934 721 321 395 992 254 602 886 811 937 967 846 470 451 636
860 836 712 566 422 184 656 896 000 000 000 000 000 a^{37} x^{37} +
74 039 182 181 398 619 376 160 457 461 874 753 062 354 760 749 262 407 389 163 495 946 356 397 958 337 461 158 516 540 569 817 346 661 570 172 385
995 758 767 959 017 783 296 000 000 000 000 000 a^{38} x^{38} +
1 874 409 675 478 446 060 155 960 948 401 892 482 591 259 765 804 111 579 472 493 568 262 187 290 084 492 687 557 380 773 919 426 497 761 270 186
987 234 399 188 835 893 248 000 000 000 000 000 a^{39} x^{39} +
46 281 720 382 183 853 337 184 220 948 194 876 113 364 438 661 829 915 542 530 705 389 189 809 631 715 868 828 577 303 059 738 925 870 648 646 592
277 392 572 563 849 216 000 000 000 000 000 a^{40} x^{40} +
1 115 222 177 883 948 273 185 161 950 558 912 677 430 468 401 489 877 482 952 547 117 811 802 641 728 093 224 784 995 254 451 540 382 425 268 592
584 997 411 387 080 704 000 000 000 000 000 a^{41} x^{41} +
26 240 521 832 563 488 780 827 340 013 150 886 527 775 727 093 879 470 187 118 755 713 218 885 687 719 840 583 176 358 928 271 538 410 006 319 825
529 350 856 166 604 800 000 000 000 000 a^{42} x^{42} +
603 230 386 955 482 500 708 674 483 060 939 920 178 752 346 985 734 946 830 316 223 292 388 176 729 191 737 544 284 113 293 598 584 138 076 317 828
260 939 222 220 800 000 000 000 000 a^{43} x^{43} +
13 555 739 032 707 471 926 037 628 832 830 110 565 814 659 482 825 504 423 153 173 557 132 318 578 184 083 989 759 193 557 159 518 744 675 872 310
747 436 836 454 400 000 000 000 000 a^{44} x^{44} +
297 928 330 389 175 207 165 662 172 150 112 320 127 794 713 908 252 844 464 904 913 343 567 441 278 771 076 698 004 254 003 505 906 476 392 798 038
405 205 196 800 000 000 000 000 a^{45} x^{45} +
6 407 060 868 584 413 057 326 068 218 281 985 379 092 359 438 887 157 945 481 826 093 410 052 500 618 732 832 215 145 247 387 223 795 191 242 968
567 853 875 200 000 000 000 000 a^{46} x^{46} +
134 885 491 970 198 169 627 917 225 648 041 797 454 575 988 187 098 062 010 143 707 229 685 315 802 499 638 572 950 426 260 783 658 846 131 430 917
217 976 320 000 000 000 000 a^{47} x^{47} +
2 781 144 164 333 982 878 926 128 363 877 150 462 980 948 210 043 259 010 518 426 953 189 387 954 690 714 197 380 421 160 016 157 914 353 225 379
736 453 120 000 000 000 000 a^{48} x^{48} +
56 184 730 592 605 714 725 780 370 987 417 181 070 322 186 061 479 980 010 473 271 781 603 797 064 458 872 674 351 942 626 589 048 774 812 633 934
069 760 000 000 000 000 a^{49} x^{49} +
1 112 568 922 625 855 737 144 165 762 127 072 892 481 627 446 761 979 802 187 589 540 229 778 159 692 254 904 442 612 725 278 991 064 847 774 929
387 520 000 000 000 000 a^{50} x^{50} +
21 603 280 050 987 490 041 634 286 643 244 133 834 594 707 704 116 112 663 836 690 101 549 090 479 461 260 280 439 082 044 252 253 686 364 561 735
680 000 000 000 000 a^{51} x^{51} +
411 491 048 590 237 905 554 938 793 204 650 168 277 994 432 459 354 526 930 222 668 600 935 056 751 643 052 960 744 419 890 519 117 835 515 461 632
000 000 000 000 a^{52} x^{52} +
7 691 421 468 976 409 449 625 024 172 049 535 855 663 447 335 688 869 662 247 152 684 129 627 229 002 673 887 116 718 128 794 749 866 084 401 152
000 000 000 000 a^{53} x^{53} +
141 126 999 430 759 806 415 138 058 202 743 777 168 136 648 361 263 663 527 470 691 451 919 765 669 773 832 791 132 442 730 178 896 625 401 856 000
000 000 000 a^{54} x^{54} +
2 542 828 818 572 248 764 236 721 769 418 806 795 822 281 952 455 201 144 639 111 557 692 248 030 086 015 005 245 629 598 741 962 101 358 592 000
000 000 000 a^{55} x^{55} +
45 005 819 797 738 916 181 180 916 272 899 235 324 288 176 149 649 577 781 223 213 410 482 266 019 221 504 517 621 762 809 592 249 581 568 000 000
000 000

a^{56}

x^{56} +
782 709 909 525 894 194 455 320 283 006 943 223 031 098 715 646 079 613 586 490 668 008 387 235 116 895 730 741 248 048 862 473 905 766 400 000 000 \
000
a^{57}
x^{57} +
13 379 656 573 092 208 452 227 697 145 417 832 872 326 473 771 727 856 642 504 113 983 049 354 446 442 662 063 952 958 100 213 229 158 400 000 000 \
000
a^{58}
x^{58} +
224 868 177 699 028 713 482 818 439 418 787 107 097 923 928 936 602 632 647 127 966 101 669 822 629 288 438 049 629 547 902 743 347 200 000 000 000
a^{59}
x^{59} +
3 716 829 383 455 020 057 567 246 932 541 935 654 511 139 321 266 159 217 307 900 266 143 302 853 376 668 397 514 537 981 863 526 400 000 000 000
a^{60} x^{60} +
60 436 250 137 480 000 936 052 795 651 088 384 626 197 387 337 661 125 484 681 305 140 541 509 811 002 738 170 968 097 266 073 600 000 000 000
a^{61} x^{61} +
966 980 002 199 680 014 976 844 730 417 414 154 019 158 197 402 578 007 754 900 882 248 664 156 976 043 810 735 489 556 257 177 600 000 000 a^{62} x^{62} +
15 228 031 530 703 622 283 099 917 014 447 466 992 427 688 148 072 094 610 313 399 720 451 404 046 866 831 665 125 819 783 577 600 000 000 a^{63} x^{63} +
236 093 512 103 932 128 420 153 752 161 976 232 440 739 351 132 900 691 632 765 887 138 781 458 090 958 630 467 066 973 388 800 000 000 a^{64} x^{64} +
3 604 481 100 823 391 273 590 133 620 793 530 266 270 829 788 288 560 177 599 479 192 958 495 543 373 414 205 604 075 929 600 000 000 a^{65} x^{65} +
54 202 723 320 652 500 354 738 851 440 504 214 530 388 417 869 000 904 926 307 957 788 849 557 043 209 236 174 497 382 400 000 000 a^{66} x^{66} +
803 003 308 454 111 116 366 501 502 822 284 659 709 458 042 503 717 110 019 377 152 427 400 845 084 581 276 659 220 480 000 000 a^{67} x^{67} +
11 722 676 035 826 439 654 985 423 398 865 469 484 809 606 459 908 278 978 385 067 918 648 187 519 482 938 345 390 080 000 000 a^{68} x^{68} +
168 671 597 637 790 498 632 883 789 911 733 373 882 152 610 933 932 071 631 439 826 167 599 820 424 214 940 221 440 000 000 a^{69} x^{69} +
2 392 504 931 032 489 342 310 408 367 542 317 360 030 533 488 424 568 391 935 316 683 228 366 247 151 984 967 680 000 000 a^{70} x^{70} +
33 461 607 427 027 822 969 376 340 804 787 655 385 042 426 411 532 425 062 032 401 164 033 094 365 762 027 520 000 000 a^{71} x^{71} +
461 539 412 786 590 661 646 570 217 997 071 108 759 205 881 538 378 276 717 688 291 917 697 853 320 855 552 000 000 a^{72} x^{72} +
6 279 447 793 014 838 933 966 941 741 456 749 779 036 814 714 807 867 710 444 738 665 546 909 568 991 232 000 000 a^{73} x^{73} +
84 287 889 839 125 354 818 348 211 294 721 473 544 118 318 319 568 694 099 929 378 061 032 343 207 936 000 000 a^{74} x^{74} +
1 116 395 891 908 945 096 931 764 388 009 555 940 981 699 580 391 638 332 449 395 735 907 713 155 072 000 000 a^{75} x^{75} +
14 593 410 351 750 916 299 761 625 987 053 018 836 362 086 018 191 350 750 972 493 279 839 387 648 000 000 a^{76} x^{76} +
188 302 069 054 850 532 900 150 012 736 167 984 985 317 238 944 404 525 818 999 913 288 250 163 200 000 a^{77} x^{77} +
2 398 752 472 036 312 521 021 019 270 524 432 929 749 264 190 374 579 946 738 852 398 576 435 200 000 a^{78} x^{78} +
30 172 987 069 639 151 207 811 563 151 250 728 676 091 373 463 831 194 298 601 916 963 225 600 000 a^{79} x^{79} +
374 819 715 150 796 909 413 808 237 903 735 759 951 445 633 091 070 736 628 595 241 779 200 000 a^{80} x^{80} +
4 599 014 909 825 728 949 862 677 765 690 009 324 557 615 129 951 788 179 491 966 156 800 000 a^{81} x^{81} +
55 745 635 270 614 896 361 971 851 705 333 446 358 274 122 787 294 402 175 660 195 840 000 a^{82} x^{82} +
667 612 398 450 477 800 742 177 864 734 532 291 715 857 757 931 669 487 133 655 040 000 a^{83} x^{83} +
7 900 738 443 200 920 718 842 341 594 491 506 410 838 553 348 303 780 912 824 320 000 a^{84} x^{84} +
92 406 297 581 297 318 349 033 235 023 292 472 641 386 588 869 050 069 155 840 000 a^{85} x^{85} +
1 068 280 896 893 610 616 751 829 306 627 658 643 253 024 148 775 145 308 160 000 a^{86} x^{86} +
12 208 924 535 926 978 477 163 763 504 316 098 780 034 561 700 287 374 950 400 a^{87} x^{87} +
137 953 949 558 496 931 945 353 259 935 775 127 458 017 646 330 930 790 400 a^{88} x^{88} +
1 541 384 911 268 122 144 640 818 546 768 437 178 301 873 143 362 355 200 a^{89} x^{89} +

$$17\,031\,877\,472\,575\,935\,299\,898\,547\,478\,104\,278\,213\,280\,366\,224\,998\,400\, a^{90} x^{90} +$$
$$186\,140\,737\,405\,201\,478\,687\,415\,819\,432\,833\,641\,675\,195\,259\,289\,600\, a^{91} x^{91} +$$
$$2\,012\,332\,296\,272\,448\,418\,242\,333\,183\,057\,660\,991\,083\,191\,992\,320\, a^{92} x^{92} + 21\,522\,270\,548\,368\,432\,280\,666\,665\,059\,440\,224\,503\,563\,550\,720\, a^{93} x^{93} +$$
$$227\,748\,894\,691\,729\,442\,123\,456\,773\,115\,769\,571\,466\,280\,960\, a^{94} x^{94} + 2\,384\,805\,180\,018\,109\,341\,606\,877\,205\,400\,728\,497\,029\,120\, a^{95} x^{95} +$$
$$24\,713\,007\,046\,819\,785\,923\,387\,328\,553\,375\,424\,839\,680\, a^{96} x^{96} + 253\,466\,738\,941\,741\,394\,086\,023\,882\,598\,722\,306\,048\, a^{97} x^{97} +$$
$$2\,573\,266\,385\,195\,344\,102\,396\,181\,549\,225\,607\,168\, a^{98} x^{98} + 25\,861\,973\,720\,556\,222\,134\,634\,990\,444\,478\,464\, a^{99} x^{99} +$$
$$257\,333\,071\,846\,330\,568\,503\,830\,750\,691\,328\, a^{100} x^{100} + 2\,535\,301\,200\,456\,458\,802\,993\,406\,410\,752\, a^{101} x^{101}\Big) +$$
$$272\,005\,392\,664\,986\,731\,633\,210\,805\,919\,809\,598\,966\,129\,140\,566\,884\,083\,609\,827\,035\,708\,497\,865\,916\,713\,108\,640\,871\,981\,221\,297\,489\,100\,404\,523\,585\,446\,\cdot$$
$$741\,785\,963\,687\,249\,684\,946\,606\,295\,913\,422\,518\,433\,356\,166\,270\,869\,248\,986\,358\,344\,554\,901\,123\,046\,875\, e^{a x} \sqrt{\pi}\, \mathrm{Erf}\left[\sqrt{a x}\right]\Big) +$$
$$\frac{1}{101} x^{101}\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right]$$

Problem 69: Result more than twice size of optimal antiderivative.

$$\int x^2\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right] dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{1}{3} x^3\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right] - \frac{\mathrm{Gamma}\left[\frac{9}{2}, a x\right]}{3 a^3}$$

Result (type 4, 75 leaves):

$$\frac{-2 e^{-a x} \sqrt{a x}\, \left(105 + 70 a x + 28 a^2 x^2 + 8 a^3 x^3\right) + 105 \sqrt{\pi}\, \mathrm{Erf}\left[\sqrt{a x}\right]}{48 a^3} + \frac{1}{3} x^3\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right]$$

Problem 70: Result more than twice size of optimal antiderivative.

$$\int x\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right] dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{1}{2} x^2\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right] - \frac{\mathrm{Gamma}\left[\frac{7}{2}, a x\right]}{2 a^2}$$

Result (type 4, 68 leaves):

$$\frac{-\frac{1}{8} e^{-a x} \sqrt{a x}\, \left(15 + 10 a x + 4 a^2 x^2\right) + \frac{15}{16} \sqrt{\pi}\, \mathrm{Erf}\left[\sqrt{a x}\right]}{a^2} + \frac{1}{2} x^2\, \mathrm{Gamma}\left[\frac{3}{2}, a x\right]$$

Problem 71: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}\left[\frac{3}{2}, a x\right] dx$$

Optimal (type 4, 22 leaves, 1 step):

$$x \,\text{Gamma}\left[\frac{3}{2}, a x\right] - \frac{\text{Gamma}\left[\frac{5}{2}, a x\right]}{a}$$

Result (type 4, 54 leaves):

$$\frac{-2 e^{-a x} \sqrt{a x} \,(3 + 2 a x) + 3 \sqrt{\pi}\, \text{Erf}\left[\sqrt{a x}\right]}{4 a} + x \,\text{Gamma}\left[\frac{3}{2}, a x\right]$$

Problem 83: Unable to integrate problem.

$$\int x^m \,\text{Gamma}[n, b x] \,dx$$

Optimal (type 4, 45 leaves, 1 step):

$$\frac{x^{1+m} \,\text{Gamma}[n, b x]}{1 + m} - \frac{x^m (b x)^{-m} \,\text{Gamma}[1 + m + n, b x]}{b (1 + m)}$$

Result (type 8, 11 leaves):

$$\int x^m \,\text{Gamma}[n, b x] \,dx$$

Problem 85: Unable to integrate problem.

$$\int (d x)^m \,\text{Gamma}[n, b x] \,dx$$

Optimal (type 4, 52 leaves, 1 step):

$$\frac{(d x)^{1+m} \,\text{Gamma}[n, b x]}{d (1 + m)} - \frac{(b x)^{-m} (d x)^m \,\text{Gamma}[1 + m + n, b x]}{b (1 + m)}$$

Result (type 8, 13 leaves):

$$\int (d x)^m \,\text{Gamma}[n, b x] \,dx$$

Problem 119: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^3 \text{Gamma}[2, a+b x] \, dx$$

Optimal (type 4, 98 leaves, 5 steps):

$$\frac{(c+d x)^4 \text{Gamma}[2, a+b x]}{4 d}+\frac{d^2 (b c-a d) e^{-a+\frac{b c}{d}} \text{Gamma}\left[5, \frac{b (c+d x)}{d}\right]}{4 b^4}-\frac{d^3 e^{-a+\frac{b c}{d}} \text{Gamma}\left[6, \frac{b (c+d x)}{d}\right]}{4 b^4}$$

Result (type 4, 223 leaves):

$$\frac{1}{4 b^4} e^{-a-b x} \Big(-24 (5+a) d^3-4 b^3 (c+d x)^2 ((2+a) c+(5+a) d x)- 12 b^2 d (c+d x) ((3+a) c+(5+a) d x)-24 b d^2 ((4+a) c+(5+a) d x)-b^5 x^2 (4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3)- b^4 x (4 (2+a) c^3+6 (3+a) c^2 d x+4 (4+a) c d^2 x^2+(5+a) d^3 x^3)+b^4 e^{a+b x} x (4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3) \text{Gamma}[2, a+b x]\Big)$$

Problem 123: Unable to integrate problem.

$$\int \frac{\text{Gamma}[2, a+b x]}{c+d x} \, dx$$

Optimal (type 4, 81 leaves, 6 steps):

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

Result (type 8, 17 leaves):

$$\int \frac{\text{Gamma}[2, a+b x]}{c+d x} \, dx$$

Problem 128: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^3 \text{Gamma}[3, a+b x] \, dx$$

Optimal (type 4, 140 leaves, 6 steps):

$$\frac{(c+d x)^4 \text{Gamma}[3, a+b x]}{4 d}-\frac{d (b c-a d)^2 e^{-a+\frac{b c}{d}} \text{Gamma}\left[5, \frac{b (c+d x)}{d}\right]}{4 b^4}+\frac{d^2 (b c-a d) e^{-a+\frac{b c}{d}} \text{Gamma}\left[6, \frac{b (c+d x)}{d}\right]}{2 b^4}-\frac{d^3 e^{-a+\frac{b c}{d}} \text{Gamma}\left[7, \frac{b (c+d x)}{d}\right]}{4 b^4}$$

Result (type 4, 361 leaves):

$$\frac{1}{4 b^4} e^{-a-b x} \left(-24 \left(30+10 a+a^2\right) d^3-24 b d^2 \left(\left(20+8 a+a^2\right) c+\left(30+10 a+a^2\right) d x\right)-4 b^3 (c+d x) \left(\left(6+4 a+a^2\right) c^2+2 \left(15+7 a+a^2\right) c d x+\left(30+10 a+a^2\right) d^2 x^2\right)-12 b^2 d \left(\left(12+6 a+a^2\right) c^2+2 \left(20+8 a+a^2\right) c d x+\left(30+10 a+a^2\right) d^2 x^2\right)- b^6 x^3 \left(4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3\right)-2 b^5 x^2 \left((6+4 a) c^3+6 (2+a) c^2 d x+2 (5+2 a) c d^2 x^2+(3+a) d^3 x^3\right)- b^4 x \left(4 \left(6+4 a+a^2\right) c^3+6 \left(12+6 a+a^2\right) c^2 d x+4 \left(20+8 a+a^2\right) c d^2 x^2+\left(30+10 a+a^2\right) d^3 x^3\right)+ b^4 e^{a+b x} x \left(4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3\right) \text{Gamma}[3, a+b x]\right)$$

Problem 131: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}[3, a+b x] \, dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{(a+b x) \text{Gamma}[3, a+b x]}{b}-\frac{\text{Gamma}[4, a+b x]}{b}$$

Result (type 4, 81 leaves):

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

Problem 132: Unable to integrate problem.

$$\int \frac{\text{Gamma}[3, a+b x]}{c+d x} \, dx$$

Optimal (type 4, 162 leaves, 13 steps):

$$-\frac{3 e^{-a-b x}}{d}+\frac{(b c-a d) e^{-a-b x}}{d^2}-\frac{e^{-a-b x} (a+b x)}{d}+\frac{2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{d}-\frac{2 (b c-a d) e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{d^2}+\frac{(b c-a d)^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]}{d^3}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{Gamma}[3, a+b x]}{c+d x} \, dx$$

Problem 136: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[3, a+b x]}{(c+d x)^5} \, dx$$

Optimal (type 4, 142 leaves, 6 steps):

$$\frac{b^4 (b c-a d)^2 e^{-a+\frac{b c}{d}} \text{Gamma}\left[-3, \frac{b (c+d x)}{d}\right]}{4 d^7}-\frac{b^4 (b c-a d) e^{-a+\frac{b c}{d}} \text{Gamma}\left[-2, \frac{b (c+d x)}{d}\right]}{2 d^6}+\frac{b^4 e^{-a+\frac{b c}{d}} \text{Gamma}\left[-1, \frac{b (c+d x)}{d}\right]}{4 d^5}-\frac{\text{Gamma}[3, a+b x]}{4 d (c+d x)^4}$$

Result (type 4, 328 leaves):

$$\frac{1}{24 d^7}\left(\frac{1}{(c+d x)^3} b d e^{-a-b x} \left(2 d^2 (b c-a d)^2-b d \left(b^2 c^2-2 (-3+a) b c d+(-6+a) a d^2\right) (c+d x)+b^2 \left(b^2 c^2-2 (-3+a) b c d+\left(6-6 a+a^2\right) d^2\right) (c+d x)^2\right)+ b^6 c^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]+6 b^5 c d e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]- 2 a b^5 c d e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]+6 b^4 d^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]- 6 a b^4 d^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]+a^2 b^4 d^2 e^{-a+\frac{b c}{d}} \text{ExpIntegralEi}\left[-\frac{b (c+d x)}{d}\right]-\frac{6 d^6 \text{Gamma}[3, a+b x]}{(c+d x)^4}\right)$$

Problem 137: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^3 \text{Gamma}[-1, a+b x] \, dx$$

Optimal (type 4, 139 leaves, 8 steps):

$$-\frac{3 d (b c-a d)^2 e^{-a-b x}}{2 b^4}-\frac{(b c-a d)^4 \text{Gamma}[-1, a+b x]}{4 b^4 d}+\frac{(c+d x)^4 \text{Gamma}[-1, a+b x]}{4 d}- \frac{(b c-a d)^3 \text{Gamma}[0, a+b x]}{b^4}-\frac{d^2 (b c-a d) \text{Gamma}[2, a+b x]}{b^4}-\frac{d^3 \text{Gamma}[3, a+b x]}{4 b^4}$$

Result (type 4, 282 leaves):

$$\frac{1}{4 b^4}\left(\left(4 (1+a) b^3 c^3-6 a (2+a) b^2 c^2 d+4 a^2 (3+a) b c d^2-a^3 (4+a) d^3\right) \text{ExpIntegralEi}[-a-b x]+\frac{1}{a+b x} e^{-a-b x} \left(a^3 (4 b c-3 d) d^2-a^4 d^3+a^2 d \left(-6 b^2 c^2+2 d^2+b d (8 c-d x)\right)+a \left(4 b^3 c^3-4 b c d^2-2 d^3+b^2 d \left(-6 c^2+4 c d x+d^2 x^2\right)\right)-b d x \left(2 d^2+2 b d (2 c+d x)+b^2 \left(6 c^2+4 c d x+d^2 x^2\right)\right)+b^4 e^{a+b x} x (a+b x) \left(4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3\right) \text{Gamma}[-1, a+b x]\right)\right)$$

Problem 144: Unable to integrate problem.

$$\int \frac{\text{Gamma}[-1, a+b x]}{(c+d x)^4} \, dx$$

Optimal (type 4, 197 leaves, 8 steps):

$$\frac{b^3 e^{-a+\frac{b c}{d}} \text{Gamma}\left[-2, \frac{b (c+d x)}{d}\right]}{3 d^2 (b c-a d)^2}+\frac{b^3 \text{Gamma}[-1, a+b x]}{3 d (b c-a d)^3}-\frac{\text{Gamma}[-1, a+b x]}{3 d (c+d x)^3}+\frac{2 b^3 e^{-a+\frac{b c}{d}} \text{Gamma}\left[-1, \frac{b (c+d x)}{d}\right]}{3 d (b c-a d)^3}-\frac{b^3 \text{Gamma}[0, a+b x]}{(b c-a d)^4}+\frac{b^3 e^{-a+\frac{b c}{d}} \text{Gamma}\left[0, \frac{b (c+d x)}{d}\right]}{(b c-a d)^4}$$

Result (type 8, 17 leaves):

$$\int \frac{\text{Gamma}[-1, a+b x]}{(c+d x)^4} \, dx$$

Problem 145: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^3 \text{Gamma}[-2, a+b x] \, dx$$

Optimal (type 4, 145 leaves, 8 steps):

$$-\frac{d^2 (4 b c-3 a d) e^{-a-b x}}{4 b^4}-\frac{(b c-a d)^4 \text{Gamma}[-2, a+b x]}{4 b^4 d}+\frac{(c+d x)^4 \text{Gamma}[-2, a+b x]}{4 d}-\frac{(b c-a d)^3 \text{Gamma}[-1, a+b x]}{b^4}-\frac{3 d (b c-a d)^2 \text{Gamma}[0, a+b x]}{2 b^4}-\frac{d^3 e^{-a} \text{Gamma}[2, b x]}{4 b^4}$$

Result (type 4, 398 leaves):

$$\frac{1}{8}\left(\frac{1}{b^4}e^{-a-b x}\left(2 d^2 \left(-4 b c+(-1+3 a) d\right)-2 b d^3 x-\frac{a\left(-4 b^3 c^3+6 a b^2 c^2 d-4 a^2 b c d^2+a^3 d^3\right)}{(a+b x)^2}+\frac{-4 (2+a) b^3 c^3+6 a (4+a) b^2 c^2 d-4 a^2 (6+a) b c d^2+a^3 (8+a) d^3}{a+b x}\right)-\frac{8 c^3 \text{ExpIntegralEi}[-a-b x]}{b}-\frac{4 a c^3 \text{ExpIntegralEi}[-a-b x]}{b}+\frac{12 c^2 d \text{ExpIntegralEi}[-a-b x]}{b^2}+\frac{24 a c^2 d \text{ExpIntegralEi}[-a-b x]}{b^2}+\frac{6 a^2 c^2 d \text{ExpIntegralEi}[-a-b x]}{b^2}-\frac{24 a c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}-\frac{24 a^2 c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}-\frac{4 a^3 c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{12 a^2 d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}+\frac{8 a^3 d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}+\frac{a^4 d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}+2 x\left(4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3\right) \text{Gamma}[-2, a+b x]\right)$$

Problem 146: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^2 \text{Gamma}[-2, a+b x] \, dx$$

Optimal (type 4, 112 leaves, 7 steps):

$$-\frac{d^2 e^{-a-b x}}{3 b^3}-\frac{(b c-a d)^3 \text{Gamma}[-2, a+b x]}{3 b^3 d}+\frac{(c+d x)^3 \text{Gamma}[-2, a+b x]}{3 d}-\frac{(b c-a d)^2 \text{Gamma}[-1, a+b x]}{b^3}-\frac{d (b c-a d) \text{Gamma}[0, a+b x]}{b^3}$$

Result (type 4, 229 leaves):

$$\frac{1}{6 b^3}\left(-\left(3 (2+a) b^2 c^2-3 \left(2+4 a+a^2\right) b c d+a \left(6+6 a+a^2\right) d^2\right) \text{ExpIntegralEi}[-a-b x]+\frac{1}{(a+b x)^2}e^{-a-b x}\left(-a^4 d^2-a^3 d (-3 b c+5 d+b d x)-2 b^2 x \left(3 b c^2+d^2 x\right)-a b \left(3 b^2 c^2 x+4 d^2 x+3 b c (c-4 d x)\right)+a^2 \left(-2 d^2+3 b d (3 c-2 d x)-3 b^2 c (c-d x)\right)+2 b^3 e^{a+b x} x (a+b x)^2 \left(3 c^2+3 c d x+d^2 x^2\right) \text{Gamma}[-2, a+b x]\right)\right)$$

Problem 148: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}[-2, a+b x] \, dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{(a+b x) \text{Gamma}[-2, a+b x]}{b}-\frac{\text{Gamma}[-1, a+b x]}{b}$$

Result (type 4, 77 leaves) :

$$\frac{e^{-a-b x} (a-(2+a)(a+b x))}{2 b (a+b x)^2}-\frac{\text{ExpIntegralEi}[-a-b x]}{b}-\frac{a \text{ExpIntegralEi}[-a-b x]}{2 b}+x \text{Gamma}[-2,a+b x]$$

Problem 153: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^3 \text{Gamma}[-3,a+b x] \, dx$$

Optimal (type 4, 139 leaves, 8 steps) :

$$-\frac{d^3 e^{-a-b x}}{4 b^4}-\frac{(b c-a d)^4 \text{Gamma}[-3,a+b x]}{4 b^4 d}+\frac{(c+d x)^4 \text{Gamma}[-3,a+b x]}{4 d}-\frac{(b c-a d)^3 \text{Gamma}[-2,a+b x]}{b^4}-\frac{3 d (b c-a d)^2 \text{Gamma}[-1,a+b x]}{2 b^4}-\frac{d^2 (b c-a d) \text{Gamma}[0,a+b x]}{b^4}$$

Result (type 4, 482 leaves) :

$$\frac{1}{24} \left(\frac{1}{b^4} e^{-a-b x} \left(-6 d^3-\frac{2 a \left(-4 b^3 c^3+6 a b^2 c^2 d-4 a^2 b c d^2+a^3 d^3\right)}{(a+b x)^3}+\frac{-4 (3+a) b^3 c^3+6 a (6+a) b^2 c^2 d-4 a^2 (9+a) b c d^2+a^3 (12+a) d^3}{(a+b x)^2}+\frac{4 (3+a) b^3 c^3-6 \left(6+6 a+a^2\right) b^2 c^2 d+4 a \left(18+9 a+a^2\right) b c d^2-a^2 (6+a)^2 d^3}{a+b x}\right)+\frac{12 c^3 \text{ExpIntegralEi}[-a-b x]}{b}+\frac{4 a c^3 \text{ExpIntegralEi}[-a-b x]}{b}-\frac{36 c^2 d \text{ExpIntegralEi}[-a-b x]}{b^2}-\frac{36 a c^2 d \text{ExpIntegralEi}[-a-b x]}{b^2}-\frac{6 a^2 c^2 d \text{ExpIntegralEi}[-a-b x]}{b^2}+\frac{24 c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{72 a c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{36 a^2 c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{4 a^3 c d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}-\frac{24 a d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}-\frac{36 a^2 d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}-\frac{12 a^3 d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}-\frac{a^4 d^3 \text{ExpIntegralEi}[-a-b x]}{b^4}+6 x \left(4 c^3+6 c^2 d x+4 c d^2 x^2+d^3 x^3\right) \text{Gamma}[-3,a+b x]\right)$$

Problem 154: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^2 \text{Gamma}[-3,a+b x] \, dx$$

Optimal (type 4, 109 leaves, 7 steps) :

$$-\frac{(b c-a d)^3 \text{Gamma}[-3,a+b x]}{3 b^3 d}+\frac{(c+d x)^3 \text{Gamma}[-3,a+b x]}{3 d}-\frac{(b c-a d)^2 \text{Gamma}[-2,a+b x]}{b^3}-\frac{d (b c-a d) \text{Gamma}[-1,a+b x]}{b^3}-\frac{d^2 \text{Gamma}[0,a+b x]}{3 b^3}$$

Result (type 4, 351 leaves):

$$\frac{1}{18}\left(\frac{2 a \left(3 b^2 c^2-3 a b c d+a^2 d^2\right) e^{-a-b x}}{b^3 (a+b x)^3}+\frac{\left(-3 (3+a) b^2 c^2+3 a (6+a) b c d-a^2 (9+a) d^2\right) e^{-a-b x}}{b^3 (a+b x)^2}+\frac{\left(3 (3+a) b^2 c^2-3 \left(6+6 a+a^2\right) b c d+a \left(18+9 a+a^2\right) d^2\right) e^{-a-b x}}{b^3 (a+b x)}+\frac{9 c^2 \text{ExpIntegralEi}[-a-b x]}{b}+\frac{3 a c^2 \text{ExpIntegralEi}[-a-b x]}{b}-\frac{18 c d \text{ExpIntegralEi}[-a-b x]}{b^2}-\frac{18 a c d \text{ExpIntegralEi}[-a-b x]}{b^2}-\frac{3 a^2 c d \text{ExpIntegralEi}[-a-b x]}{b^2}+\frac{6 d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{18 a d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{9 a^2 d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+\frac{a^3 d^2 \text{ExpIntegralEi}[-a-b x]}{b^3}+6 x \left(3 c^2+3 c d x+d^2 x^2\right) \text{Gamma}[-3,a+b x]\right)$$

Problem 155: Result more than twice size of optimal antiderivative.

$$\int (c+d x) \text{Gamma}[-3,a+b x] \, dx$$

Optimal (type 4, 84 leaves, 6 steps):

$$-\frac{(b c-a d)^2 \text{Gamma}[-3,a+b x]}{2 b^2 d}+\frac{(c+d x)^2 \text{Gamma}[-3,a+b x]}{2 d}-\frac{(b c-a d) \text{Gamma}[-2,a+b x]}{b^2}-\frac{d \text{Gamma}[-1,a+b x]}{2 b^2}$$

Result (type 4, 270 leaves):

$$d e^{-b x}\left(-\frac{a^2 e^{-a}}{6 b^2 (a+b x)^3}+\frac{a (6+a) e^{-a}}{12 b^2 (a+b x)^2}-\frac{\left(6+6 a+a^2\right) e^{-a}}{12 b^2 (a+b x)}\right)+c e^{-b x}\left(\frac{a e^{-a}}{3 b (a+b x)^3}-\frac{(3+a) e^{-a}}{6 b (a+b x)^2}+\frac{(3+a) e^{-a}}{6 b (a+b x)}\right)+\frac{c \text{ExpIntegralEi}[-a-b x]}{2 b}+\frac{a c \text{ExpIntegralEi}[-a-b x]}{6 b}-\frac{d \text{ExpIntegralEi}[-a-b x]}{2 b^2}-\frac{a d \text{ExpIntegralEi}[-a-b x]}{2 b^2}-\frac{a^2 d \text{ExpIntegralEi}[-a-b x]}{12 b^2}+c x \text{Gamma}[-3,a+b x]+\frac{1}{2} d x^2 \text{Gamma}[-3,a+b x]$$

Problem 156: Result more than twice size of optimal antiderivative.

$$\int \text{Gamma}[-3,a+b x] \, dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{(a+b x)\,\text{Gamma}[-3,a+b x]}{b}-\frac{\text{Gamma}[-2,a+b x]}{b}$$

Result (type 4, 89 leaves):

$$\frac{1}{6}\left(\frac{e^{-a-b x}\left(2 a-(3+a)(a+b x)+(3+a)(a+b x)^2\right)}{b (a+b x)^3}+\frac{3\,\text{ExpIntegralEi}[-a-b x]}{b}+\frac{a\,\text{ExpIntegralEi}[-a-b x]}{b}+6 x\,\text{Gamma}[-3,a+b x]\right)$$

Problem 158: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-3,a+b x]}{(c+d x)^2}\,dx$$

Optimal (type 4, 144 leaves, 8 steps):

$$\frac{b\,\text{Gamma}[-3,a+b x]}{d (b c-a d)}-\frac{\text{Gamma}[-3,a+b x]}{d (c+d x)}-\frac{b\,\text{Gamma}[-2,a+b x]}{(b c-a d)^2}+\frac{b d\,\text{Gamma}[-1,a+b x]}{(b c-a d)^3}-\frac{b d^2\,\text{Gamma}[0,a+b x]}{(b c-a d)^4}+\frac{b d^2 e^{-a+\frac{b c}{d}}\,\text{Gamma}\left[0,\frac{b (c+d x)}{d}\right]}{(b c-a d)^4}$$

Result (type 4, 395 leaves):

$$\frac{b d^2\,\text{ExpIntegralEi}[-a-b x]}{(-b c+a d)^4}+\frac{1}{6 d (b c-a d)^3 (a+b x)^3}$$
$$b\left(\left(3 a^2 d^2+3 a b d (-c+d x)+b^2 (c^2-c d x+d^2 x^2)\right)\left(e^{-a-b x}\left(2-a-b x+(a+b x)^2\right)+(a+b x)^3\,\text{ExpIntegralEi}[-a-b x]\right)-d e^{-a-b x}(a+b x)\right.$$
$$(-3 a d+b (c-2 d x))\left(1-a^2-2 b x-b^2 x^2-2 a (1+b x)-e^{a+b x}(a+b x)^2 (3+a+b x)\,\text{ExpIntegralEi}[-a-b x]\right)+d^2 e^{-a-b x}(a+b x)^2$$
$$\left.\left(2+a^2+5 b x+b^2 x^2+a (5+2 b x)+e^{a+b x}\left(a^3+3 a^2 (2+b x)+3 a (2+4 b x+b^2 x^2)+b x (6+6 b x+b^2 x^2)\right)\text{ExpIntegralEi}[-a-b x]\right)\right)-$$
$$\frac{b d^2 e^{-a+\frac{b c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b c}{d}-b x\right]}{(-b c+a d)^4}-\frac{\text{Gamma}[-3,a+b x]}{d (c+d x)}$$

Problem 159: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Gamma}[-3,a+b x]}{(c+d x)^3}\,dx$$

Optimal (type 4, 205 leaves, 9 steps):

$$\frac{b^2\,\text{Gamma}[-3,\,a+b\,x]}{2\,d\,(b\,c-a\,d)^2}-\frac{\text{Gamma}[-3,\,a+b\,x]}{2\,d\,(c+d\,x)^2}-\frac{b^2\,\text{Gamma}[-2,\,a+b\,x]}{(b\,c-a\,d)^3}+\frac{3\,b^2\,d\,\text{Gamma}[-1,\,a+b\,x]}{2\,(b\,c-a\,d)^4}+$$
$$\frac{b^2\,d\,e^{-a+\frac{b\,c}{d}}\,\text{Gamma}\left[-1,\,\frac{b\,(c+d\,x)}{d}\right]}{2\,(b\,c-a\,d)^4}-\frac{2\,b^2\,d^2\,\text{Gamma}[0,\,a+b\,x]}{(b\,c-a\,d)^5}+\frac{2\,b^2\,d^2\,e^{-a+\frac{b\,c}{d}}\,\text{Gamma}\left[0,\,\frac{b\,(c+d\,x)}{d}\right]}{(b\,c-a\,d)^5}$$

Result (type 4, 877 leaves):

$$\frac{1}{12}\left(\frac{2\left(\frac{e^{-a-b\,x}\,(2\,a-(3+a)\,(a+b\,x)+(3+a)\,(a+b\,x)^2)}{b\,(a+b\,x)^3}+\frac{3\,\text{ExpIntegralEi}[-a-b\,x]}{b}+\frac{a\,\text{ExpIntegralEi}[-a-b\,x]}{b}+6\,x\,\text{Gamma}[-3,\,a+b\,x]\right)}{(c+d\,x)^3}+\right.$$
$$d\left(e^{-a-b\,x}\left(-\frac{2\,b^2\,(b\,c-3\,a\,d)}{d^2\,(-b\,c+a\,d)^3\,(a+b\,x)^3}-\frac{b^2\,(b^2\,c^2-4\,a\,b\,c\,d+3\,(-4+a)\,a\,d^2)}{d^2\,(b\,c-a\,d)^4\,(a+b\,x)^2}-\frac{b^2\,(b^3\,c^3-5\,a\,b^2\,c^2\,d+a\,(-6+7\,a)\,b\,c\,d^2-3\,a\,(8-2\,a+a^2)\,d^3)}{d^2\,(-b\,c+a\,d)^5\,(a+b\,x)}+\right.\right.$$
$$\frac{2\,((3+a)\,b^2\,c^2+(3-5\,a-2\,a^2)\,b\,c\,d+a\,(-1+2\,a+a^2)\,d^2)}{b\,(b\,c-a\,d)^3\,(c+d\,x)^3}+\frac{2\,((3+a)\,b^2\,c^2-2\,(-3+2\,a+a^2)\,b\,c\,d+a^2\,(1+a)\,d^2)}{(b\,c-a\,d)^4\,(c+d\,x)^2}+$$
$$\left.\frac{2\,b\,((3+a)\,b^2\,c^2+(12-3\,a-2\,a^2)\,b\,c\,d+a^3\,d^2)}{(b\,c-a\,d)^5\,(c+d\,x)}\right)+\frac{18\,b^3\,c\,\text{ExpIntegralEi}[-a-b\,x]}{(b\,c-a\,d)^5}-\frac{12\,a\,b^3\,c\,\text{ExpIntegralEi}[-a-b\,x]}{(b\,c-a\,d)^5}+$$
$$\frac{3\,a^2\,b^3\,c\,\text{ExpIntegralEi}[-a-b\,x]}{(b\,c-a\,d)^5}+\frac{b^5\,c^3\,\text{ExpIntegralEi}[-a-b\,x]}{d^2\,(b\,c-a\,d)^5}+\frac{6\,b^4\,c^2\,\text{ExpIntegralEi}[-a-b\,x]}{d\,(b\,c-a\,d)^5}+\frac{24\,b^2\,d\,\text{ExpIntegralEi}[-a-b\,x]}{(b\,c-a\,d)^5}+$$
$$\frac{3\,a\,b^4\,c^2\,\text{ExpIntegralEi}[-a-b\,x]}{d\,(-b\,c+a\,d)^5}+\frac{18\,a\,b^2\,d\,\text{ExpIntegralEi}[-a-b\,x]}{(-b\,c+a\,d)^5}-\frac{6\,a^2\,b^2\,d\,\text{ExpIntegralEi}[-a-b\,x]}{(-b\,c+a\,d)^5}+$$
$$\frac{a^3\,b^2\,d\,\text{ExpIntegralEi}[-a-b\,x]}{(-b\,c+a\,d)^5}-\frac{2\,(3+a)\,\text{ExpIntegralEi}[-a-b\,x]}{b\,d\,(c+d\,x)^3}+\frac{6\,b^3\,c\,e^{-a+\frac{b\,c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b\,(c+d\,x)}{d}\right]}{(b\,c-a\,d)^5}-$$
$$\left.\left.\frac{24\,b^2\,d\,e^{-a+\frac{b\,c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b\,(c+d\,x)}{d}\right]}{(b\,c-a\,d)^5}+\frac{6\,a\,b^2\,d\,e^{-a+\frac{b\,c}{d}}\,\text{ExpIntegralEi}\left[-\frac{b\,(c+d\,x)}{d}\right]}{(-b\,c+a\,d)^5}-\frac{6\,(c+3\,d\,x)\,\text{Gamma}[-3,\,a+b\,x]}{d^2\,(c+d\,x)^3}\right)\right)$$

Problem 160: Unable to integrate problem.

$$\int\frac{\text{Gamma}[-3,\,a+b\,x]}{(c+d\,x)^4}\,dx$$

Optimal (type 4, 248 leaves, 10 steps):

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

$$\frac{2\,b^3\,d\,\text{Gamma}[-1,\,a+b\,x]}{(b\,c-a\,d)^5}+\frac{4\,b^3\,d\,e^{-a+\frac{b\,c}{d}}\,\text{Gamma}\left[-1,\,\frac{b\,(c+d\,x)}{d}\right]}{3\,(b\,c-a\,d)^5}-\frac{10\,b^3\,d^2\,\text{Gamma}[0,\,a+b\,x]}{3\,(b\,c-a\,d)^6}+\frac{10\,b^3\,d^2\,e^{-a+\frac{b\,c}{d}}\,\text{Gamma}\left[0,\,\frac{b\,(c+d\,x)}{d}\right]}{3\,(b\,c-a\,d)^6}$$

Result (type 8, 17 leaves):

$$\int\frac{\text{Gamma}[-3,\,a+b\,x]}{(c+d\,x)^4}\,dx$$

Problem 230: Unable to integrate problem.

$$\int\left(\frac{\text{PolyGamma}[1,\,a+b\,x]}{x^2}-\frac{b\,\text{PolyGamma}[2,\,a+b\,x]}{x}\right)dx$$

Optimal (type 4, 12 leaves, 2 steps):

$$-\frac{\text{PolyGamma}[1,\,a+b\,x]}{x}$$

Result (type 8, 27 leaves):

$$\int\left(\frac{\text{PolyGamma}[1,\,a+b\,x]}{x^2}-\frac{b\,\text{PolyGamma}[2,\,a+b\,x]}{x}\right)dx$$

Problem 231: Unable to integrate problem.

$$\int\left(\frac{\text{PolyGamma}[n,\,a+b\,x]}{x^2}-\frac{b\,\text{PolyGamma}[1+n,\,a+b\,x]}{x}\right)dx$$

Optimal (type 4, 12 leaves, 2 steps):

$$-\frac{\text{PolyGamma}[n,\,a+b\,x]}{x}$$

Result (type 8, 29 leaves):

$$\int\left(\frac{\text{PolyGamma}[n,\,a+b\,x]}{x^2}-\frac{b\,\text{PolyGamma}[1+n,\,a+b\,x]}{x}\right)dx$$

Test results for the 14 problems in "8.7 Zeta function.m"

Problem 7: Unable to integrate problem.

$$\int \left(-\frac{b\,\text{PolyGamma}[2, a+b x]}{x}+\frac{\text{Zeta}[2, a+b x]}{x^2}\right) dx$$

Optimal (type 4, 12 leaves, 3 steps):

$$-\frac{\text{PolyGamma}[1, a+b x]}{x}$$

Result (type 8, 27 leaves):

$$\int \left(-\frac{b\,\text{PolyGamma}[2, a+b x]}{x}+\frac{\text{Zeta}[2, a+b x]}{x^2}\right) dx$$

Problem 14: Unable to integrate problem.

$$\int \left(\frac{\text{Zeta}[s, a+b x]}{x^2}+\frac{b\,s\,\text{Zeta}[1+s, a+b x]}{x}\right) dx$$

Optimal (type 4, 12 leaves, 2 steps):

$$-\frac{\text{Zeta}[s, a+b x]}{x}$$

Result (type 8, 29 leaves):

$$\int \left(\frac{\text{Zeta}[s, a+b x]}{x^2}+\frac{b\,s\,\text{Zeta}[1+s, a+b x]}{x}\right) dx$$

Test results for the 198 problems in "8.8 Polylogarithm function.m"

Problem 17: Unable to integrate problem.

$$\int \frac{\text{PolyLog}[3, a x]}{x^3} dx$$

Optimal (type 4, 70 leaves, 5 steps):

$$-\frac{a}{8 x}+\frac{1}{8} a^2 \text{Log}[x]-\frac{1}{8} a^2 \text{Log}[1-a x]+\frac{\text{Log}[1-a x]}{8 x^2}-\frac{\text{PolyLog}[2, a x]}{4 x^2}-\frac{\text{PolyLog}[3, a x]}{2 x^2}$$

Result (type 9, 25 leaves):

$$\frac{\text{MeijerG}[\{\{1,1,1,1\},\{3\}\},\{\{1,2\},\{0,0,0\}\},-a x]}{x^2}$$

Problem 18: Unable to integrate problem.

$$\int \frac{\text{PolyLog}[3,a x]}{x^4}\,dx$$

Optimal (type 4, 80 leaves, 5 steps):

$$-\frac{a}{54 x^2}-\frac{a^2}{27 x}+\frac{1}{27} a^3 \text{Log}[x]-\frac{1}{27} a^3 \text{Log}[1-a x]+\frac{\text{Log}[1-a x]}{27 x^3}-\frac{\text{PolyLog}[2,a x]}{9 x^3}-\frac{\text{PolyLog}[3,a x]}{3 x^3}$$

Result (type 9, 25 leaves):

$$\frac{\text{MeijerG}[\{\{1,1,1,1\},\{4\}\},\{\{1,3\},\{0,0,0\}\},-a x]}{x^3}$$

Problem 22: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{PolyLog}\left[2,a x^2\right]}{x}\,dx$$

Optimal (type 4, 11 leaves, 1 step):

$$\frac{1}{2} \text{PolyLog}\left[3,a x^2\right]$$

Result (type 4, 108 leaves):

$$-\text{Log}[x]^2 \text{Log}\left[1-\sqrt{a}\, x\right]-\text{Log}[x]^2 \text{Log}\left[1+\sqrt{a}\, x\right]+\text{Log}[x]^2 \text{Log}\left[1-a x^2\right]-2 \text{Log}[x] \text{PolyLog}\left[2,-\sqrt{a}\, x\right]-2 \text{Log}[x] \text{PolyLog}\left[2,\sqrt{a}\, x\right]+\text{Log}[x] \text{PolyLog}\left[2,a x^2\right]+2 \text{PolyLog}\left[3,-\sqrt{a}\, x\right]+2 \text{PolyLog}\left[3,\sqrt{a}\, x\right]$$

Problem 37: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[3,a x^2\right]}{x^5}\,dx$$

Optimal (type 4, 78 leaves, 6 steps):

$$-\frac{a}{16 x^2}+\frac{1}{8} a^2 \text{Log}[x]-\frac{1}{16} a^2 \text{Log}\left[1-a x^2\right]+\frac{\text{Log}\left[1-a x^2\right]}{16 x^4}-\frac{\text{PolyLog}\left[2,a x^2\right]}{8 x^4}-\frac{\text{PolyLog}\left[3,a x^2\right]}{4 x^4}$$

Result (type 9, 30 leaves):

$$\frac{\text{MeijerG}\left[\{\{1,1,1,1\},\{3\}\},\{\{1,2\},\{0,0,0\}\},-a x^2\right]}{2 x^4}$$

Problem 38: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[3, a x^2\right]}{x^7} \, dx$$

Optimal (type 4, 88 leaves, 6 steps):

$$-\frac{a}{108 x^4}-\frac{a^2}{54 x^2}+\frac{1}{27} a^3 \text{Log}[x]-\frac{1}{54} a^3 \text{Log}\left[1-a x^2\right]+\frac{\text{Log}\left[1-a x^2\right]}{54 x^6}-\frac{\text{PolyLog}\left[2, a x^2\right]}{18 x^6}-\frac{\text{PolyLog}\left[3, a x^2\right]}{6 x^6}$$

Result (type 9, 30 leaves):

$$\frac{\text{MeijerG}\left[\{\{1,1,1,1\},\{4\}\},\{\{1,3\},\{0,0,0\}\},-a x^2\right]}{2 x^6}$$

Problem 48: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{PolyLog}\left[2, a x^q\right]}{x} \, dx$$

Optimal (type 4, 11 leaves, 1 step):

$$\frac{\text{PolyLog}\left[3, a x^q\right]}{q}$$

Result (type 4, 80 leaves):

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

Problem 52: Unable to integrate problem.

$$\int x^2 \text{PolyLog}\left[3, a x^q\right] \, dx$$

Optimal (type 5, 88 leaves, 4 steps):

$$-\frac{a q^3 x^{3+q} \text{Hypergeometric2F1}\left[1, \frac{3+q}{q}, 2+\frac{3}{q}, a x^q\right]}{27 (3+q)}-\frac{1}{27} q^2 x^3 \text{Log}\left[1-a x^q\right]-\frac{1}{9} q x^3 \text{PolyLog}\left[2, a x^q\right]+\frac{1}{3} x^3 \text{PolyLog}\left[3, a x^q\right]$$

Result (type 9, 41 leaves):

$$-\frac{x^3\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,\frac{-3+q}{q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,-\frac{3}{q}\right\}\right\},-a\,x^q\right]}{q}$$

Problem 53: Unable to integrate problem.

$$\int x\,\text{PolyLog}\left[3,a\,x^q\right]\,dx$$

Optimal (type 5, 88 leaves, 4 steps):

$$-\frac{a\,q^3\,x^{2+q}\,\text{Hypergeometric2F1}\left[1,\frac{2+q}{q},2\left(1+\frac{1}{q}\right),a\,x^q\right]}{8\,(2+q)}-\frac{1}{8}\,q^2\,x^2\,\text{Log}\left[1-a\,x^q\right]-\frac{1}{4}\,q\,x^2\,\text{PolyLog}\left[2,a\,x^q\right]+\frac{1}{2}\,x^2\,\text{PolyLog}\left[3,a\,x^q\right]$$

Result (type 9, 41 leaves):

$$-\frac{x^2\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,\frac{-2+q}{q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,-\frac{2}{q}\right\}\right\},-a\,x^q\right]}{q}$$

Problem 54: Unable to integrate problem.

$$\int \text{PolyLog}\left[3,a\,x^q\right]\,dx$$

Optimal (type 5, 69 leaves, 4 steps):

$$-\frac{a\,q^3\,x^{1+q}\,\text{Hypergeometric2F1}\left[1,1+\frac{1}{q},2+\frac{1}{q},a\,x^q\right]}{1+q}-q^2\,x\,\text{Log}\left[1-a\,x^q\right]-q\,x\,\text{PolyLog}\left[2,a\,x^q\right]+x\,\text{PolyLog}\left[3,a\,x^q\right]$$

Result (type 9, 39 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,\frac{-1+q}{q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,-\frac{1}{q}\right\}\right\},-a\,x^q\right]}{q}$$

Problem 56: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[3,a\,x^q\right]}{x^2}\,dx$$

Optimal (type 5, 84 leaves, 4 steps):

$$-\frac{a\,q^3\,x^{-1+q}\,\text{Hypergeometric2F1}\left[1,-\frac{1-q}{q},2-\frac{1}{q},a\,x^q\right]}{1-q}+\frac{q^2\,\text{Log}\left[1-a\,x^q\right]}{x}-\frac{q\,\text{PolyLog}\left[2,a\,x^q\right]}{x}-\frac{\text{PolyLog}\left[3,a\,x^q\right]}{x}$$

Result (type 9, 37 leaves):

$$-\frac{\text{MeijerG}\left[\left\{\left\{1,1,1,1,1+\frac{1}{q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,\frac{1}{q}\right\}\right\},-a\,x^q\right]}{q\,x}$$

Problem 57: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[3,a\,x^q\right]}{x^3}\,dx$$

Optimal (type 5, 95 leaves, 4 steps):

$$-\frac{a\,q^3\,x^{-2+q}\,\text{Hypergeometric2F1}\left[1,-\frac{2-q}{q},2\left(1-\frac{1}{q}\right),a\,x^q\right]}{8\,(2-q)}+\frac{q^2\,\text{Log}\left[1-a\,x^q\right]}{8\,x^2}-\frac{q\,\text{PolyLog}\left[2,a\,x^q\right]}{4\,x^2}-\frac{\text{PolyLog}\left[3,a\,x^q\right]}{2\,x^2}$$

Result (type 9, 41 leaves):

$$-\frac{\text{MeijerG}\left[\left\{\left\{1,1,1,1,\frac{2+q}{q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,\frac{2}{q}\right\}\right\},-a\,x^q\right]}{q\,x^2}$$

Problem 58: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[3,a\,x^q\right]}{x^4}\,dx$$

Optimal (type 5, 93 leaves, 4 steps):

$$-\frac{a\,q^3\,x^{-3+q}\,\text{Hypergeometric2F1}\left[1,-\frac{3-q}{q},2-\frac{3}{q},a\,x^q\right]}{27\,(3-q)}+\frac{q^2\,\text{Log}\left[1-a\,x^q\right]}{27\,x^3}-\frac{q\,\text{PolyLog}\left[2,a\,x^q\right]}{9\,x^3}-\frac{\text{PolyLog}\left[3,a\,x^q\right]}{3\,x^3}$$

Result (type 9, 41 leaves):

$$-\frac{\text{MeijerG}\left[\left\{\left\{1,1,1,1,\frac{3+q}{q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,\frac{3}{q}\right\}\right\},-a\,x^q\right]}{q\,x^3}$$

Problem 74: Result unnecessarily involves higher level functions.

$$\int \frac{\text{PolyLog}\left[2,a\,x^2\right]}{\sqrt{d\,x}}\,dx$$

Optimal (type 4, 115 leaves, 8 steps):

$$-\frac{32\sqrt{d x}}{d}+\frac{16 \text{ArcTan}\left[\frac{a^{1/4}\sqrt{d x}}{\sqrt{d}}\right]}{a^{1/4}\sqrt{d}}+\frac{16 \text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d x}}{\sqrt{d}}\right]}{a^{1/4}\sqrt{d}}+\frac{8\sqrt{d x}\ \text{Log}\left[1-a x^2\right]}{d}+\frac{2\sqrt{d x}\ \text{PolyLog}\left[2, a x^2\right]}{d}$$

Result (type 5, 57 leaves):

$$\frac{5 x \text{Gamma}\left[\frac{5}{4}\right]\left(-16+16 \text{Hypergeometric2F1}\left[\frac{1}{4}, 1, \frac{5}{4}, a x^2\right]+4 \text{Log}\left[1-a x^2\right]+\text{PolyLog}\left[2, a x^2\right]\right)}{2\sqrt{d x}\ \text{Gamma}\left[\frac{9}{4}\right]}$$

Problem 75: Result unnecessarily involves higher level functions.

$$\int \frac{\text{PolyLog}\left[2, a x^2\right]}{(d x)^{3/2}} \, dx$$

Optimal (type 4, 103 leaves, 7 steps):

$$-\frac{16 a^{1/4} \text{ArcTan}\left[\frac{a^{1/4}\sqrt{d x}}{\sqrt{d}}\right]}{d^{3/2}}+\frac{16 a^{1/4} \text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d x}}{\sqrt{d}}\right]}{d^{3/2}}+\frac{8 \text{Log}\left[1-a x^2\right]}{d\sqrt{d x}}-\frac{2 \text{PolyLog}\left[2, a x^2\right]}{d\sqrt{d x}}$$

Result (type 5, 62 leaves):

$$\frac{x \text{Gamma}\left[\frac{3}{4}\right]\left(16 a x^2 \text{Hypergeometric2F1}\left[\frac{3}{4}, 1, \frac{7}{4}, a x^2\right]+12 \text{Log}\left[1-a x^2\right]-3 \text{PolyLog}\left[2, a x^2\right]\right)}{2 (d x)^{3/2} \text{Gamma}\left[\frac{7}{4}\right]}$$

Problem 76: Result unnecessarily involves higher level functions.

$$\int \frac{\text{PolyLog}\left[2, a x^2\right]}{(d x)^{5/2}} \, dx$$

Optimal (type 4, 111 leaves, 7 steps):

$$\frac{16 a^{3/4} \text{ArcTan}\left[\frac{a^{1/4}\sqrt{d x}}{\sqrt{d}}\right]}{9 d^{5/2}}+\frac{16 a^{3/4} \text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d x}}{\sqrt{d}}\right]}{9 d^{5/2}}+\frac{8 \text{Log}\left[1-a x^2\right]}{9 d (d x)^{3/2}}-\frac{2 \text{PolyLog}\left[2, a x^2\right]}{3 d (d x)^{3/2}}$$

Result (type 5, 62 leaves):

$$\frac{x \text{Gamma}\left[\frac{1}{4}\right]\left(16 a x^2 \text{Hypergeometric2F1}\left[\frac{1}{4}, 1, \frac{5}{4}, a x^2\right]+4 \text{Log}\left[1-a x^2\right]-3 \text{PolyLog}\left[2, a x^2\right]\right)}{18 (d x)^{5/2} \text{Gamma}\left[\frac{5}{4}\right]}$$

Problem 77: Result unnecessarily involves higher level functions.

$$\int \frac{\text{PolyLog}\left[2, a x^2\right]}{(d x)^{7/2}} \, dx$$

Optimal (type 4, 126 leaves, 8 steps):

$$-\frac{32 a}{25 d^3 \sqrt{d x}} - \frac{16 a^{5/4} \text{ArcTan}\left[\frac{a^{1/4} \sqrt{d x}}{\sqrt{d}}\right]}{25 d^{7/2}} + \frac{16 a^{5/4} \text{ArcTanh}\left[\frac{a^{1/4} \sqrt{d x}}{\sqrt{d}}\right]}{25 d^{7/2}} + \frac{8 \text{Log}\left[1 - a x^2\right]}{25 d (d x)^{5/2}} - \frac{2 \text{PolyLog}\left[2, a x^2\right]}{5 d (d x)^{5/2}}$$

Result (type 5, 70 leaves):

$$-\frac{1}{150 (d x)^{7/2} \text{Gamma}\left[\frac{3}{4}\right]} x \text{Gamma}\left[-\frac{1}{4}\right] \left(-48 a x^2 + 16 a^2 x^4 \text{Hypergeometric2F1}\left[\frac{3}{4}, 1, \frac{7}{4}, a x^2\right] + 12 \text{Log}\left[1 - a x^2\right] - 15 \text{PolyLog}\left[2, a x^2\right]\right)$$

Problem 78: Result unnecessarily involves higher level functions.

$$\int (d x)^{5/2} \text{PolyLog}\left[3, a x^2\right] dx$$

Optimal (type 4, 161 leaves, 10 steps):

$$\frac{128 d (d x)^{3/2}}{1029 a} + \frac{128 (d x)^{7/2}}{2401 d} + \frac{64 d^{5/2} \text{ArcTan}\left[\frac{a^{1/4} \sqrt{d x}}{\sqrt{d}}\right]}{343 a^{7/4}} - \frac{64 d^{5/2} \text{ArcTanh}\left[\frac{a^{1/4} \sqrt{d x}}{\sqrt{d}}\right]}{343 a^{7/4}} - \frac{32 (d x)^{7/2} \text{Log}\left[1 - a x^2\right]}{343 d} - \frac{8 (d x)^{7/2} \text{PolyLog}\left[2, a x^2\right]}{49 d} + \frac{2 (d x)^{7/2} \text{PolyLog}\left[3, a x^2\right]}{7 d}$$

Result (type 5, 89 leaves):

$$-\frac{1}{14406 a \text{Gamma}\left[\frac{15}{4}\right]} 11 d (d x)^{3/2} \text{Gamma}\left[\frac{11}{4}\right] \left(-448 - 192 a x^2 + 448 \text{Hypergeometric2F1}\left[\frac{3}{4}, 1, \frac{7}{4}, a x^2\right] + 336 a x^2 \text{Log}\left[1 - a x^2\right] + 588 a x^2 \text{PolyLog}\left[2, a x^2\right] - 1029 a x^2 \text{PolyLog}\left[3, a x^2\right]\right)$$

Problem 79: Result unnecessarily involves higher level functions.

$$\int (d x)^{3/2} \text{PolyLog}\left[3, a x^2\right] dx$$

Optimal (type 4, 161 leaves, 10 steps):

$$\frac{128\,d\sqrt{d\,x}}{125\,a}+\frac{128\,(d\,x)^{5/2}}{625\,d}-\frac{64\,d^{3/2}\,\text{ArcTan}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{125\,a^{5/4}}-\frac{64\,d^{3/2}\,\text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{125\,a^{5/4}}-\frac{32\,(d\,x)^{5/2}\,\text{Log}\left[1-a\,x^2\right]}{125\,d}-\frac{8\,(d\,x)^{5/2}\,\text{PolyLog}\left[2,\,a\,x^2\right]}{25\,d}+\frac{2\,(d\,x)^{5/2}\,\text{PolyLog}\left[3,\,a\,x^2\right]}{5\,d}$$

Result (type 5, 89 leaves):

$$-\frac{1}{1250\,a\,\text{Gamma}\left[\frac{13}{4}\right]}9\,d\sqrt{d\,x}\;\text{Gamma}\left[\frac{9}{4}\right]\left(-320-64\,a\,x^2+320\,\text{Hypergeometric2F1}\left[\frac{1}{4},\,1,\,\frac{5}{4},\,a\,x^2\right]+80\,a\,x^2\,\text{Log}\left[1-a\,x^2\right]+100\,a\,x^2\,\text{PolyLog}\left[2,\,a\,x^2\right]-125\,a\,x^2\,\text{PolyLog}\left[3,\,a\,x^2\right]\right)$$

Problem 80: Result unnecessarily involves higher level functions.

$$\int\sqrt{d\,x}\;\text{PolyLog}\left[3,\,a\,x^2\right]\,dx$$

Optimal (type 4, 146 leaves, 9 steps):

$$\frac{128\,(d\,x)^{3/2}}{81\,d}+\frac{64\sqrt{d}\;\text{ArcTan}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{27\,a^{3/4}}-\frac{64\sqrt{d}\;\text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{27\,a^{3/4}}-\frac{32\,(d\,x)^{3/2}\,\text{Log}\left[1-a\,x^2\right]}{27\,d}-\frac{8\,(d\,x)^{3/2}\,\text{PolyLog}\left[2,\,a\,x^2\right]}{9\,d}+\frac{2\,(d\,x)^{3/2}\,\text{PolyLog}\left[3,\,a\,x^2\right]}{3\,d}$$

Result (type 5, 68 leaves):

$$-\frac{1}{162\,\text{Gamma}\left[\frac{11}{4}\right]}7\,x\sqrt{d\,x}\;\text{Gamma}\left[\frac{7}{4}\right]\left(-64+64\,\text{Hypergeometric2F1}\left[\frac{3}{4},\,1,\,\frac{7}{4},\,a\,x^2\right]+48\,\text{Log}\left[1-a\,x^2\right]+36\,\text{PolyLog}\left[2,\,a\,x^2\right]-27\,\text{PolyLog}\left[3,\,a\,x^2\right]\right)$$

Problem 81: Result unnecessarily involves higher level functions.

$$\int\frac{\text{PolyLog}\left[3,\,a\,x^2\right]}{\sqrt{d\,x}}\,dx$$

Optimal (type 4, 134 leaves, 9 steps):

$$\frac{128\sqrt{d\,x}}{d}-\frac{64\,\text{ArcTan}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{a^{1/4}\sqrt{d}}-\frac{64\,\text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{a^{1/4}\sqrt{d}}-\frac{32\sqrt{d\,x}\;\text{Log}\left[1-a\,x^2\right]}{d}-\frac{8\sqrt{d\,x}\;\text{PolyLog}\left[2,\,a\,x^2\right]}{d}+\frac{2\sqrt{d\,x}\;\text{PolyLog}\left[3,\,a\,x^2\right]}{d}$$

Result (type 5, 68 leaves):

$$-\frac{1}{2\sqrt{d\,x}\;\text{Gamma}\left[\frac{9}{4}\right]}5\,x\,\text{Gamma}\left[\frac{5}{4}\right]\left(-64+64\,\text{Hypergeometric2F1}\left[\frac{1}{4},1,\frac{5}{4},a\,x^2\right]+16\,\text{Log}\left[1-a\,x^2\right]+4\,\text{PolyLog}\left[2,a\,x^2\right]-\text{PolyLog}\left[3,a\,x^2\right]\right)$$

Problem 82: Result unnecessarily involves higher level functions.

$$\int\frac{\text{PolyLog}\left[3,a\,x^2\right]}{(d\,x)^{3/2}}\,dx$$

Optimal (type 4, 122 leaves, 8 steps):

$$-\frac{64\,a^{1/4}\,\text{ArcTan}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{d^{3/2}}+\frac{64\,a^{1/4}\,\text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{d^{3/2}}+\frac{32\,\text{Log}\left[1-a\,x^2\right]}{d\sqrt{d\,x}}-\frac{8\,\text{PolyLog}\left[2,a\,x^2\right]}{d\sqrt{d\,x}}-\frac{2\,\text{PolyLog}\left[3,a\,x^2\right]}{d\sqrt{d\,x}}$$

Result (type 5, 71 leaves):

$$\frac{1}{2\,(d\,x)^{3/2}\,\text{Gamma}\left[\frac{7}{4}\right]}x\,\text{Gamma}\left[\frac{3}{4}\right]\left(64\,a\,x^2\,\text{Hypergeometric2F1}\left[\frac{3}{4},1,\frac{7}{4},a\,x^2\right]+48\,\text{Log}\left[1-a\,x^2\right]-12\,\text{PolyLog}\left[2,a\,x^2\right]-3\,\text{PolyLog}\left[3,a\,x^2\right]\right)$$

Problem 83: Result unnecessarily involves higher level functions.

$$\int\frac{\text{PolyLog}\left[3,a\,x^2\right]}{(d\,x)^{5/2}}\,dx$$

Optimal (type 4, 132 leaves, 8 steps):

$$\frac{64\,a^{3/4}\,\text{ArcTan}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{27\,d^{5/2}}+\frac{64\,a^{3/4}\,\text{ArcTanh}\left[\frac{a^{1/4}\sqrt{d\,x}}{\sqrt{d}}\right]}{27\,d^{5/2}}+\frac{32\,\text{Log}\left[1-a\,x^2\right]}{27\,d\,(d\,x)^{3/2}}-\frac{8\,\text{PolyLog}\left[2,a\,x^2\right]}{9\,d\,(d\,x)^{3/2}}-\frac{2\,\text{PolyLog}\left[3,a\,x^2\right]}{3\,d\,(d\,x)^{3/2}}$$

Result (type 5, 71 leaves):

$$\frac{1}{54\,(d\,x)^{5/2}\,\text{Gamma}\left[\frac{5}{4}\right]}x\,\text{Gamma}\left[\frac{1}{4}\right]\left(64\,a\,x^2\,\text{Hypergeometric2F1}\left[\frac{1}{4},1,\frac{5}{4},a\,x^2\right]+16\,\text{Log}\left[1-a\,x^2\right]-12\,\text{PolyLog}\left[2,a\,x^2\right]-9\,\text{PolyLog}\left[3,a\,x^2\right]\right)$$

Problem 84: Result unnecessarily involves higher level functions.

$$\int\frac{\text{PolyLog}\left[3,a\,x^2\right]}{(d\,x)^{7/2}}\,dx$$

Optimal (type 4, 147 leaves, 9 steps):

$$-\frac{128\,a}{125\,d^3\,\sqrt{d\,x}}-\frac{64\,a^{5/4}\,\text{ArcTan}\left[\frac{a^{1/4}\,\sqrt{d\,x}}{\sqrt{d}}\right]}{125\,d^{7/2}}+\frac{64\,a^{5/4}\,\text{ArcTanh}\left[\frac{a^{1/4}\,\sqrt{d\,x}}{\sqrt{d}}\right]}{125\,d^{7/2}}+\frac{32\,\text{Log}\left[1-a\,x^2\right]}{125\,d\,\left(d\,x\right)^{5/2}}-\frac{8\,\text{PolyLog}\left[2,\,a\,x^2\right]}{25\,d\,\left(d\,x\right)^{5/2}}-\frac{2\,\text{PolyLog}\left[3,\,a\,x^2\right]}{5\,d\,\left(d\,x\right)^{5/2}}$$

Result (type 5, 79 leaves):

$$-\frac{1}{750\,\left(d\,x\right)^{7/2}\,\text{Gamma}\left[\frac{3}{4}\right]}$$
$$x\,\text{Gamma}\left[-\frac{1}{4}\right]\,\left(-192\,a\,x^2+64\,a^2\,x^4\,\text{Hypergeometric2F1}\left[\frac{3}{4},\,1,\,\frac{7}{4},\,a\,x^2\right]+48\,\text{Log}\left[1-a\,x^2\right]-60\,\text{PolyLog}\left[2,\,a\,x^2\right]-75\,\text{PolyLog}\left[3,\,a\,x^2\right]\right)$$

Problem 85: Result unnecessarily involves higher level functions.

$$\int\frac{\text{PolyLog}\left[3,\,a\,x^2\right]}{\left(d\,x\right)^{9/2}}\,dx$$

Optimal (type 4, 147 leaves, 9 steps):

$$-\frac{128\,a}{1029\,d^3\,\left(d\,x\right)^{3/2}}+\frac{64\,a^{7/4}\,\text{ArcTan}\left[\frac{a^{1/4}\,\sqrt{d\,x}}{\sqrt{d}}\right]}{343\,d^{9/2}}+\frac{64\,a^{7/4}\,\text{ArcTanh}\left[\frac{a^{1/4}\,\sqrt{d\,x}}{\sqrt{d}}\right]}{343\,d^{9/2}}+\frac{32\,\text{Log}\left[1-a\,x^2\right]}{343\,d\,\left(d\,x\right)^{7/2}}-\frac{8\,\text{PolyLog}\left[2,\,a\,x^2\right]}{49\,d\,\left(d\,x\right)^{7/2}}-\frac{2\,\text{PolyLog}\left[3,\,a\,x^2\right]}{7\,d\,\left(d\,x\right)^{7/2}}$$

Result (type 5, 84 leaves):

$$-\frac{1}{686\,d^5\,x^4\,\text{Gamma}\left[\frac{1}{4}\right]}$$
$$\sqrt{d\,x}\,\text{Gamma}\left[-\frac{3}{4}\right]\,\left(-64\,a\,x^2+192\,a^2\,x^4\,\text{Hypergeometric2F1}\left[\frac{1}{4},\,1,\,\frac{5}{4},\,a\,x^2\right]+48\,\text{Log}\left[1-a\,x^2\right]-84\,\text{PolyLog}\left[2,\,a\,x^2\right]-147\,\text{PolyLog}\left[3,\,a\,x^2\right]\right)$$

Problem 88: Unable to integrate problem.

$$\int\frac{\text{PolyLog}\left[2,\,a\,x^q\right]}{\sqrt{d\,x}}\,dx$$

Optimal (type 5, 93 leaves, 4 steps):

$$\frac{8\,a\,q^2\,x^q\,\sqrt{d\,x}\,\text{Hypergeometric2F1}\left[1,\,\frac{\frac{1}{2}+q}{q},\,\frac{1}{2}\left(4+\frac{1}{q}\right),\,a\,x^q\right]}{d\,\left(1+2\,q\right)}+\frac{4\,q\,\sqrt{d\,x}\,\text{Log}\left[1-a\,x^q\right]}{d}+\frac{2\,\sqrt{d\,x}\,\text{PolyLog}\left[2,\,a\,x^q\right]}{d}$$

Result (type 9, 48 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1-\frac{1}{2q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,-\frac{1}{2q}\right\}\right\},-a\,x^q\right]}{q\sqrt{d\,x}}$$

Problem 89: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[2,a\,x^q\right]}{(d\,x)^{3/2}}\,dx$$

Optimal (type 5, 97 leaves, 4 steps):

$$-\frac{8\,a\,q^2\,x^q\,\text{Hypergeometric2F1}\left[1,\frac{1}{2}\left(2-\frac{1}{q}\right),\frac{1}{2}\left(4-\frac{1}{q}\right),a\,x^q\right]}{d\,(1-2q)\sqrt{d\,x}}+\frac{4\,q\,\text{Log}\left[1-a\,x^q\right]}{d\sqrt{d\,x}}-\frac{2\,\text{PolyLog}\left[2,a\,x^q\right]}{d\sqrt{d\,x}}$$

Result (type 9, 48 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1+\frac{1}{2q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,\frac{1}{2q}\right\}\right\},-a\,x^q\right]}{q\,(d\,x)^{3/2}}$$

Problem 90: Unable to integrate problem.

$$\int \frac{\text{PolyLog}\left[2,a\,x^q\right]}{(d\,x)^{5/2}}\,dx$$

Optimal (type 5, 105 leaves, 4 steps):

$$-\frac{8\,a\,q^2\,x^{-1+q}\,\text{Hypergeometric2F1}\left[1,\frac{1}{2}\left(2-\frac{3}{q}\right),\frac{1}{2}\left(4-\frac{3}{q}\right),a\,x^q\right]}{9\,d^2\,(3-2q)\sqrt{d\,x}}+\frac{4\,q\,\text{Log}\left[1-a\,x^q\right]}{9\,d\,(d\,x)^{3/2}}-\frac{2\,\text{PolyLog}\left[2,a\,x^q\right]}{3\,d\,(d\,x)^{3/2}}$$

Result (type 9, 48 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1+\frac{3}{2q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,\frac{3}{2q}\right\}\right\},-a\,x^q\right]}{q\,(d\,x)^{5/2}}$$

Problem 91: Unable to integrate problem.

$$\int (d\,x)^{3/2}\,\text{PolyLog}\left[3,a\,x^q\right]\,dx$$

Optimal (type 5, 125 leaves, 5 steps):

$$-\frac{16\,a\,d\,q^3\,x^{2+q}\,\sqrt{d\,x}\,\text{Hypergeometric2F1}\left[1,\,\frac{\frac{5}{2}+q}{q},\,\frac{1}{2}\left(4+\frac{5}{q}\right),\,a\,x^q\right]}{125\,(5+2\,q)}-\frac{8\,q^2\,(d\,x)^{5/2}\,\text{Log}\left[1-a\,x^q\right]}{125\,d}-\frac{4\,q\,(d\,x)^{5/2}\,\text{PolyLog}\left[2,\,a\,x^q\right]}{25\,d}+\frac{2\,(d\,x)^{5/2}\,\text{PolyLog}\left[3,\,a\,x^q\right]}{5\,d}$$

Result (type 9, 50 leaves):

$$-\frac{x\,(d\,x)^{3/2}\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,1-\frac{5}{2\,q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,-\frac{5}{2\,q}\right\}\right\},-a\,x^q\right]}{q}$$

Problem 92: Unable to integrate problem.

$$\int\sqrt{d\,x}\,\text{PolyLog}\left[3,\,a\,x^q\right]\,dx$$

Optimal (type 5, 124 leaves, 5 steps):

$$-\frac{16\,a\,q^3\,x^{1+q}\,\sqrt{d\,x}\,\text{Hypergeometric2F1}\left[1,\,\frac{\frac{3}{2}+q}{q},\,\frac{1}{2}\left(4+\frac{3}{q}\right),\,a\,x^q\right]}{27\,(3+2\,q)}-\frac{8\,q^2\,(d\,x)^{3/2}\,\text{Log}\left[1-a\,x^q\right]}{27\,d}-\frac{4\,q\,(d\,x)^{3/2}\,\text{PolyLog}\left[2,\,a\,x^q\right]}{9\,d}+\frac{2\,(d\,x)^{3/2}\,\text{PolyLog}\left[3,\,a\,x^q\right]}{3\,d}$$

Result (type 9, 50 leaves):

$$-\frac{x\,\sqrt{d\,x}\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,1-\frac{3}{2\,q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,-\frac{3}{2\,q}\right\}\right\},-a\,x^q\right]}{q}$$

Problem 93: Unable to integrate problem.

$$\int\frac{\text{PolyLog}\left[3,\,a\,x^q\right]}{\sqrt{d\,x}}\,dx$$

Optimal (type 5, 115 leaves, 5 steps):

$$-\frac{16\,a\,q^3\,x^q\,\sqrt{d\,x}\,\text{Hypergeometric2F1}\left[1,\,\frac{\frac{1}{2}+q}{q},\,\frac{1}{2}\left(4+\frac{1}{q}\right),\,a\,x^q\right]}{d\,(1+2\,q)}-\frac{8\,q^2\,\sqrt{d\,x}\,\text{Log}\left[1-a\,x^q\right]}{d}-\frac{4\,q\,\sqrt{d\,x}\,\text{PolyLog}\left[2,\,a\,x^q\right]}{d}+\frac{2\,\sqrt{d\,x}\,\text{PolyLog}\left[3,\,a\,x^q\right]}{d}$$

Result (type 9, 50 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,1-\frac{1}{2q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,-\frac{1}{2q}\right\}\right\},-a\,x^q\right]}{q\sqrt{d\,x}}$$

Problem 94: Unable to integrate problem.

$$\int\frac{\text{PolyLog}[3,a\,x^q]}{(d\,x)^{3/2}}\,dx$$

Optimal (type 5, 119 leaves, 5 steps):

$$-\frac{16\,a\,q^3\,x^q\,\text{Hypergeometric2F1}\left[1,\frac{1}{2}\left(2-\frac{1}{q}\right),\frac{1}{2}\left(4-\frac{1}{q}\right),a\,x^q\right]}{d\,(1-2q)\sqrt{d\,x}}+\frac{8\,q^2\,\text{Log}[1-a\,x^q]}{d\sqrt{d\,x}}-\frac{4\,q\,\text{PolyLog}[2,a\,x^q]}{d\sqrt{d\,x}}-\frac{2\,\text{PolyLog}[3,a\,x^q]}{d\sqrt{d\,x}}$$

Result (type 9, 50 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,1+\frac{1}{2q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,\frac{1}{2q}\right\}\right\},-a\,x^q\right]}{q\,(d\,x)^{3/2}}$$

Problem 95: Unable to integrate problem.

$$\int\frac{\text{PolyLog}[3,a\,x^q]}{(d\,x)^{5/2}}\,dx$$

Optimal (type 5, 129 leaves, 5 steps):

$$-\frac{16\,a\,q^3\,x^{-1+q}\,\text{Hypergeometric2F1}\left[1,\frac{1}{2}\left(2-\frac{3}{q}\right),\frac{1}{2}\left(4-\frac{3}{q}\right),a\,x^q\right]}{27\,d^2\,(3-2q)\sqrt{d\,x}}+\frac{8\,q^2\,\text{Log}[1-a\,x^q]}{27\,d\,(d\,x)^{3/2}}-\frac{4\,q\,\text{PolyLog}[2,a\,x^q]}{9\,d\,(d\,x)^{3/2}}-\frac{2\,\text{PolyLog}[3,a\,x^q]}{3\,d\,(d\,x)^{3/2}}$$

Result (type 9, 50 leaves):

$$-\frac{x\,\text{MeijerG}\left[\left\{\left\{1,1,1,1,1+\frac{3}{2q}\right\},\{\}\right\},\left\{\{1\},\left\{0,0,0,\frac{3}{2q}\right\}\right\},-a\,x^q\right]}{q\,(d\,x)^{5/2}}$$

Problem 101: Unable to integrate problem.

$$\int\left(\text{PolyLog}\left[-\frac{3}{2},a\,x\right]+\text{PolyLog}\left[-\frac{1}{2},a\,x\right]\right)dx$$

Optimal (type 4, 9 leaves, 2 steps):

$x\,\text{PolyLog}\left[-\frac{1}{2}, a\,x\right]$

Result (type 8, 17 leaves):

$$\int\left(\text{PolyLog}\left[-\frac{3}{2}, a\,x\right]+\text{PolyLog}\left[-\frac{1}{2}, a\,x\right]\right)\,dx$$

Problem 103: Unable to integrate problem.

$$\int(d\,x)^m\,\text{PolyLog}[3, a\,x]\,dx$$

Optimal (type 5, 102 leaves, 4 steps):

$$-\frac{a\,(d\,x)^{2+m}\,\text{Hypergeometric2F1}[1, 2+m, 3+m, a\,x]}{d^2\,(1+m)^3\,(2+m)}-\frac{(d\,x)^{1+m}\,\text{Log}[1-a\,x]}{d\,(1+m)^3}-\frac{(d\,x)^{1+m}\,\text{PolyLog}[2, a\,x]}{d\,(1+m)^2}+\frac{(d\,x)^{1+m}\,\text{PolyLog}[3, a\,x]}{d\,(1+m)}$$

Result (type 9, 88 leaves):

$$-\frac{1}{(1+m)^4\,\text{Gamma}[1+m]}x\,(d\,x)^m\,\text{Gamma}[2+m]\,\left(a\,(1+m)\,x\,\text{Gamma}[1+m]\,\text{HypergeometricPFQRegularized}[\{1, 2+m\}, \{3+m\}, a\,x]+\text{Log}[1-a\,x]+(1+m)\,\text{PolyLog}[2, a\,x]-\text{PolyLog}[3, a\,x]-2\,m\,\text{PolyLog}[3, a\,x]-m^2\,\text{PolyLog}[3, a\,x]\right)$$

Problem 104: Unable to integrate problem.

$$\int(d\,x)^m\,\text{PolyLog}[4, a\,x]\,dx$$

Optimal (type 5, 121 leaves, 5 steps):

$$\frac{a\,(d\,x)^{2+m}\,\text{Hypergeometric2F1}[1, 2+m, 3+m, a\,x]}{d^2\,(1+m)^4\,(2+m)}+\frac{(d\,x)^{1+m}\,\text{Log}[1-a\,x]}{d\,(1+m)^4}+\frac{(d\,x)^{1+m}\,\text{PolyLog}[2, a\,x]}{d\,(1+m)^3}-\frac{(d\,x)^{1+m}\,\text{PolyLog}[3, a\,x]}{d\,(1+m)^2}+\frac{(d\,x)^{1+m}\,\text{PolyLog}[4, a\,x]}{d\,(1+m)}$$

Result (type 9, 119 leaves):

$$\frac{1}{(1+m)^5\,\text{Gamma}[1+m]}x\,(d\,x)^m\,\text{Gamma}[2+m]\,\left(a\,(1+m)\,x\,\text{Gamma}[1+m]\,\text{HypergeometricPFQRegularized}[\{1, 2+m\}, \{3+m\}, a\,x]+\text{Log}[1-a\,x]+(1+m)\,\text{PolyLog}[2, a\,x]-\text{PolyLog}[3, a\,x]-2\,m\,\text{PolyLog}[3, a\,x]-m^2\,\text{PolyLog}[3, a\,x]+\text{PolyLog}[4, a\,x]+3\,m\,\text{PolyLog}[4, a\,x]+3\,m^2\,\text{PolyLog}[4, a\,x]+m^3\,\text{PolyLog}[4, a\,x]\right)$$

Problem 106: Unable to integrate problem.

$$\int (d\,x)^m\,\text{PolyLog}\left[3,\,a\,x^2\right]\,dx$$

Optimal (type 5, 118 leaves, 5 steps):

$$-\frac{8\,a\,(d\,x)^{3+m}\,\text{Hypergeometric2F1}\left[1,\,\frac{3+m}{2},\,\frac{5+m}{2},\,a\,x^2\right]}{d^3\,(1+m)^3\,(3+m)}-\frac{4\,(d\,x)^{1+m}\,\text{Log}\left[1-a\,x^2\right]}{d\,(1+m)^3}-\frac{2\,(d\,x)^{1+m}\,\text{PolyLog}\left[2,\,a\,x^2\right]}{d\,(1+m)^2}+\frac{(d\,x)^{1+m}\,\text{PolyLog}\left[3,\,a\,x^2\right]}{d\,(1+m)}$$

Result (type 9, 126 leaves):

$$-\frac{1}{(1+m)^4\,\text{Gamma}\left[\frac{1+m}{2}\right]}2\,x\,(d\,x)^m\,\text{Gamma}\left[\frac{3+m}{2}\right]\left(2\,a\,(1+m)\,x^2\,\text{Gamma}\left[\frac{1+m}{2}\right]\,\text{HypergeometricPFQRegularized}\left[\left\{1,\,\frac{3+m}{2}\right\},\,\left\{\frac{5+m}{2}\right\},\,a\,x^2\right]+4\,\text{Log}\left[1-a\,x^2\right]+\right.$$
$$\left.2\,(1+m)\,\text{PolyLog}\left[2,\,a\,x^2\right]-\text{PolyLog}\left[3,\,a\,x^2\right]-2\,m\,\text{PolyLog}\left[3,\,a\,x^2\right]-m^2\,\text{PolyLog}\left[3,\,a\,x^2\right]\right)$$

Problem 107: Unable to integrate problem.

$$\int (d\,x)^m\,\text{PolyLog}\left[4,\,a\,x^2\right]\,dx$$

Optimal (type 5, 142 leaves, 6 steps):

$$\frac{16\,a\,(d\,x)^{3+m}\,\text{Hypergeometric2F1}\left[1,\,\frac{3+m}{2},\,\frac{5+m}{2},\,a\,x^2\right]}{d^3\,(1+m)^4\,(3+m)}+\frac{8\,(d\,x)^{1+m}\,\text{Log}\left[1-a\,x^2\right]}{d\,(1+m)^4}+$$
$$\frac{4\,(d\,x)^{1+m}\,\text{PolyLog}\left[2,\,a\,x^2\right]}{d\,(1+m)^3}-\frac{2\,(d\,x)^{1+m}\,\text{PolyLog}\left[3,\,a\,x^2\right]}{d\,(1+m)^2}+\frac{(d\,x)^{1+m}\,\text{PolyLog}\left[4,\,a\,x^2\right]}{d\,(1+m)}$$

Result (type 9, 166 leaves):

$$\frac{1}{(1+m)^5\,\text{Gamma}\left[\frac{1+m}{2}\right]}2\,x\,(d\,x)^m\,\text{Gamma}\left[\frac{3+m}{2}\right]\left(4\,a\,(1+m)\,x^2\,\text{Gamma}\left[\frac{1+m}{2}\right]\,\text{HypergeometricPFQRegularized}\left[\left\{1,\,\frac{3+m}{2}\right\},\,\left\{\frac{5+m}{2}\right\},\,a\,x^2\right]+8\,\text{Log}\left[1-a\,x^2\right]+\right.$$
$$4\,(1+m)\,\text{PolyLog}\left[2,\,a\,x^2\right]-2\,\text{PolyLog}\left[3,\,a\,x^2\right]-4\,m\,\text{PolyLog}\left[3,\,a\,x^2\right]-2\,m^2\,\text{PolyLog}\left[3,\,a\,x^2\right]+$$
$$\left.\text{PolyLog}\left[4,\,a\,x^2\right]+3\,m\,\text{PolyLog}\left[4,\,a\,x^2\right]+3\,m^2\,\text{PolyLog}\left[4,\,a\,x^2\right]+m^3\,\text{PolyLog}\left[4,\,a\,x^2\right]\right)$$

Problem 109: Unable to integrate problem.

$$\int (d x)^m \text{PolyLog}[3, a x^3] \, dx$$

Optimal (type 5, 118 leaves, 5 steps):

$$-\frac{27 a (d x)^{4+m} \text{Hypergeometric2F1}\left[1, \frac{4+m}{3}, \frac{7+m}{3}, a x^3\right]}{d^4 (1+m)^3 (4+m)} - \frac{9 (d x)^{1+m} \text{Log}[1 - a x^3]}{d (1+m)^3} - \frac{3 (d x)^{1+m} \text{PolyLog}[2, a x^3]}{d (1+m)^2} + \frac{(d x)^{1+m} \text{PolyLog}[3, a x^3]}{d (1+m)}$$

Result (type 9, 126 leaves):

$$-\frac{1}{(1+m)^4 \text{Gamma}\left[\frac{1+m}{3}\right]} 3 x (d x)^m \text{Gamma}\left[\frac{4+m}{3}\right] \left(3 a (1+m) x^3 \text{Gamma}\left[\frac{1+m}{3}\right] \text{HypergeometricPFQRegularized}\left[\left\{1, \frac{4+m}{3}\right\}, \left\{\frac{7+m}{3}\right\}, a x^3\right] + 9 \text{Log}[1 - a x^3] + 3 (1+m) \text{PolyLog}[2, a x^3] - \text{PolyLog}[3, a x^3] - 2 m \text{PolyLog}[3, a x^3] - m^2 \text{PolyLog}[3, a x^3]\right)$$

Problem 110: Unable to integrate problem.

$$\int (d x)^m \text{PolyLog}[4, a x^3] \, dx$$

Optimal (type 5, 142 leaves, 6 steps):

$$\frac{81 a (d x)^{4+m} \text{Hypergeometric2F1}\left[1, \frac{4+m}{3}, \frac{7+m}{3}, a x^3\right]}{d^4 (1+m)^4 (4+m)} + \frac{27 (d x)^{1+m} \text{Log}[1 - a x^3]}{d (1+m)^4} + \frac{9 (d x)^{1+m} \text{PolyLog}[2, a x^3]}{d (1+m)^3} - \frac{3 (d x)^{1+m} \text{PolyLog}[3, a x^3]}{d (1+m)^2} + \frac{(d x)^{1+m} \text{PolyLog}[4, a x^3]}{d (1+m)}$$

Result (type 9, 166 leaves):

$$\frac{1}{(1+m)^5 \text{Gamma}\left[\frac{1+m}{3}\right]} 3 x (d x)^m \text{Gamma}\left[\frac{4+m}{3}\right] \left(9 a (1+m) x^3 \text{Gamma}\left[\frac{1+m}{3}\right] \text{HypergeometricPFQRegularized}\left[\left\{1, \frac{4+m}{3}\right\}, \left\{\frac{7+m}{3}\right\}, a x^3\right] + 27 \text{Log}[1 - a x^3] + 9 (1+m) \text{PolyLog}[2, a x^3] - 3 \text{PolyLog}[3, a x^3] - 6 m \text{PolyLog}[3, a x^3] - 3 m^2 \text{PolyLog}[3, a x^3] + \text{PolyLog}[4, a x^3] + 3 m \text{PolyLog}[4, a x^3] + 3 m^2 \text{PolyLog}[4, a x^3] + m^3 \text{PolyLog}[4, a x^3]\right)$$

Problem 112: Unable to integrate problem.

$$\int (d\,x)^m\,\text{PolyLog}\left[3,\,a\,x^q\right]\,dx$$

Optimal (type 5, 130 leaves, 5 steps):

$$-\frac{a\,q^3\,x^{1+q}\,(d\,x)^m\,\text{Hypergeometric2F1}\left[1,\,\frac{1+m+q}{q},\,\frac{1+m+2\,q}{q},\,a\,x^q\right]}{(1+m)^3\,(1+m+q)}-\frac{q^2\,(d\,x)^{1+m}\,\text{Log}\left[1-a\,x^q\right]}{d\,(1+m)^3}-\frac{q\,(d\,x)^{1+m}\,\text{PolyLog}\left[2,\,a\,x^q\right]}{d\,(1+m)^2}+\frac{(d\,x)^{1+m}\,\text{PolyLog}\left[3,\,a\,x^q\right]}{d\,(1+m)}$$

Result (type 9, 50 leaves):

$$-\frac{x\,(d\,x)^m\,\text{MeijerG}\left[\left\{\left\{1,\,1,\,1,\,1,\,1-\frac{1+m}{q}\right\},\,\{\}\right\},\,\left\{\{1\},\,\left\{0,\,0,\,0,\,-\frac{1+m}{q}\right\}\right\},\,-a\,x^q\right]}{q}$$

Problem 113: Unable to integrate problem.

$$\int (d\,x)^m\,\text{PolyLog}\left[4,\,a\,x^q\right]\,dx$$

Optimal (type 5, 154 leaves, 6 steps):

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

Result (type 9, 52 leaves):

$$-\frac{x\,(d\,x)^m\,\text{MeijerG}\left[\left\{\left\{1,\,1,\,1,\,1,\,1,\,1-\frac{1+m}{q}\right\},\,\{\}\right\},\,\left\{\{1\},\,\left\{0,\,0,\,0,\,0,\,-\frac{1+m}{q}\right\}\right\},\,-a\,x^q\right]}{q}$$

Problem 152: Unable to integrate problem.

$$\int -\frac{\text{Log}\left[1-e\left(\frac{a+b\,x}{c+d\,x}\right)^n\right]}{(a+b\,x)\,(c+d\,x)}\,dx$$

Optimal (type 4, 33 leaves, 1 step):

$$\frac{\text{PolyLog}\left[2,\ e\left(\frac{a+b x}{c+d x}\right)^n\right]}{(b c-a d)\ n}$$

Result (type 8, 40 leaves):

$$-\int\frac{\text{Log}\left[1-e\left(\frac{a+b x}{c+d x}\right)^n\right]}{(a+b x)\ (c+d x)}\,dx$$

Problem 181: Unable to integrate problem.

$$\int\frac{\left(g+h\,\text{Log}\left[f\ (d+e x)^n\right]\right)\,\text{PolyLog}\left[2,\ c\ (a+b x)\right]}{x^2}\,dx$$

Optimal (type 4, 2498 leaves, 22 steps):

$$-\frac{b\,g\,\text{Log}\left[\frac{b c x}{1-a c}\right]\,\text{Log}[1-a c-b c x]}{a}-\frac{b\,h\,n\,\text{Log}\left[\frac{b c x}{1-a c}\right]\,\text{Log}[1-a c-b c x]\,\text{Log}[d+e x]}{a}-$$

$$\frac{b\,h\,n\left(\text{Log}\left[\frac{b c x}{1-a c}\right]+\text{Log}\left[\frac{b c d+e-a c e}{b c\ (d+e x)}\right]-\text{Log}\left[\frac{(b c d+e-a c e)\ x}{(1-a c)\ (d+e x)}\right]\right)\,\text{Log}\left[\frac{(1-a c)\ (d+e x)}{d\ (1-a c-b c x)}\right]^2}{2 a}+$$

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

$$\frac{b\,h\,n\left(\text{Log}[c\ (a+b x)]+\text{Log}\left[\frac{b c d+e-a c e}{b c\ (d+e x)}\right]-\text{Log}\left[\frac{(b c d+e-a c e)\ (a+b x)}{b\ (d+e x)}\right]\right)\,\text{Log}\left[\frac{b\ (d+e x)}{(b d-a e)\ (1-c\ (a+b x))}\right]^2}{2 a}-$$

$$\frac{e\,h\,n\left(\text{Log}[c\ (a+b x)]+\text{Log}\left[\frac{b c d+e-a c e}{b c\ (d+e x)}\right]-\text{Log}\left[\frac{(b c d+e-a c e)\ (a+b x)}{b\ (d+e x)}\right]\right)\,\text{Log}\left[\frac{b\ (d+e x)}{(b d-a e)\ (1-c\ (a+b x))}\right]^2}{2 d}+\frac{e\,h\,n\,\text{Log}[x]\,\text{Log}\left[1+\frac{b x}{a}\right]\,\text{Log}[1-c\ (a+b x)]}{d}+$$

$$\frac{b\,h\,n\,\text{Log}[c\ (a+b x)]\,\text{Log}[d+e x]\,\text{Log}[1-c\ (a+b x)]}{a}-\frac{e\,h\,n\,\text{Log}[c\ (a+b x)]\,\text{Log}[d+e x]\,\text{Log}[1-c\ (a+b x)]}{d}-$$

$$\frac{b\,h\,n\left(\text{Log}[c\ (a+b x)]-\text{Log}\left[-\frac{e\ (a+b x)}{b d-a e}\right]\right)\left(\text{Log}\left[\frac{b\ (d+e x)}{(b d-a e)\ (1-c\ (a+b x))}\right]+\text{Log}[1-c\ (a+b x)]\right)^2}{2 a}+$$

$$\frac{e\,h\,n\left(\text{Log}[c\ (a+b x)]-\text{Log}\left[-\frac{e\ (a+b x)}{b d-a e}\right]\right)\left(\text{Log}\left[\frac{b\ (d+e x)}{(b d-a e)\ (1-c\ (a+b x))}\right]+\text{Log}[1-c\ (a+b x)]\right)^2}{2 d}+$$

$$\frac{e\,h\,n\left(\text{Log}\left[1+\frac{b x}{a}\right]+\text{Log}\left[\frac{1-a c}{1-c\ (a+b x)}\right]-\text{Log}\left[\frac{(1-a c)\ (a+b x)}{a\ (1-c\ (a+b x))}\right]\right)\,\text{Log}\left[-\frac{a\ (1-c\ (a+b x))}{b x}\right]^2}{2 d}+$$

$$\frac{e\,h\,n\left(\text{Log}\left[c\,(a+b\,x)\right]-\text{Log}\left[1+\frac{b\,x}{a}\right]\right)\left(\text{Log}[x]+\text{Log}\left[-\frac{a\,(1-c\,(a+b\,x))}{b\,x}\right]\right)^2}{2\,d}+\frac{e\,h\,n\left(\text{Log}\left[1-c\,(a+b\,x)\right]-\text{Log}\left[-\frac{a\,(1-c\,(a+b\,x))}{b\,x}\right]\right)\text{PolyLog}\left[2,-\frac{b\,x}{a}\right]}{d}-$$

$$\frac{b\,g\,\text{PolyLog}\left[2,c\,(a+b\,x)\right]}{a}+\frac{e\,h\,n\,\text{Log}[x]\,\text{PolyLog}\left[2,c\,(a+b\,x)\right]}{d}-\frac{e\,h\,n\,\text{Log}[d+e\,x]\,\text{PolyLog}\left[2,c\,(a+b\,x)\right]}{d}+$$

$$\frac{b\,h\left(n\,\text{Log}[d+e\,x]-\text{Log}\left[f\,(d+e\,x)^n\right]\right)\text{PolyLog}\left[2,c\,(a+b\,x)\right]}{a}-\frac{\left(g+h\,\text{Log}\left[f\,(d+e\,x)^n\right]\right)\text{PolyLog}\left[2,c\,(a+b\,x)\right]}{x}-$$

$$\frac{b\,g\,\text{PolyLog}\left[2,1-\frac{b\,c\,x}{1-a\,c}\right]}{a}-\frac{b\,h\,n\left(\text{Log}[d+e\,x]-\text{Log}\left[\frac{(1-a\,c)\,(d+e\,x)}{d\,(1-a\,c-b\,c\,x)}\right]\right)\text{PolyLog}\left[2,1-\frac{b\,c\,x}{1-a\,c}\right]}{a}+$$

$$\frac{b\,h\left(n\,\text{Log}[d+e\,x]-\text{Log}\left[f\,(d+e\,x)^n\right]\right)\text{PolyLog}\left[2,1-\frac{b\,c\,x}{1-a\,c}\right]}{a}-\frac{b\,h\,n\,\text{Log}\left[\frac{(1-a\,c)\,(d+e\,x)}{d\,(1-a\,c-b\,c\,x)}\right]\text{PolyLog}\left[2,\frac{d\,(1-a\,c-b\,c\,x)}{(1-a\,c)\,(d+e\,x)}\right]}{a}+$$

$$\frac{b\,h\,n\,\text{Log}\left[\frac{(1-a\,c)\,(d+e\,x)}{d\,(1-a\,c-b\,c\,x)}\right]\text{PolyLog}\left[2,-\frac{e\,(1-a\,c-b\,c\,x)}{b\,c\,(d+e\,x)}\right]}{a}+\frac{b\,h\,n\left(\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]+\text{Log}\left[1-c\,(a+b\,x)\right]\right)\text{PolyLog}\left[2,\frac{b\,(d+e\,x)}{b\,d-a\,e}\right]}{a}-$$

$$\frac{e\,h\,n\left(\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]+\text{Log}\left[1-c\,(a+b\,x)\right]\right)\text{PolyLog}\left[2,\frac{b\,(d+e\,x)}{b\,d-a\,e}\right]}{d}-$$

$$\frac{b\,h\,n\left(\text{Log}[1-a\,c-b\,c\,x]+\text{Log}\left[\frac{(1-a\,c)\,(d+e\,x)}{d\,(1-a\,c-b\,c\,x)}\right]\right)\text{PolyLog}\left[2,1+\frac{e\,x}{d}\right]}{a}+\frac{e\,h\,n\,\text{Log}\left[-\frac{a\,(1-c\,(a+b\,x))}{b\,x}\right]\text{PolyLog}\left[2,-\frac{b\,x}{a\,(1-c\,(a+b\,x))}\right]}{d}-$$

$$\frac{e\,h\,n\,\text{Log}\left[-\frac{a\,(1-c\,(a+b\,x))}{b\,x}\right]\text{PolyLog}\left[2,-\frac{b\,c\,x}{1-c\,(a+b\,x)}\right]}{d}+\frac{b\,h\,n\left(\text{Log}[d+e\,x]-\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]\right)\text{PolyLog}\left[2,1-c\,(a+b\,x)\right]}{a}-$$

$$\frac{e\,h\,n\left(\text{Log}[d+e\,x]-\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]\right)\text{PolyLog}\left[2,1-c\,(a+b\,x)\right]}{d}+\frac{e\,h\,n\left(\text{Log}[x]+\text{Log}\left[-\frac{a\,(1-c\,(a+b\,x))}{b\,x}\right]\right)\text{PolyLog}\left[2,1-c\,(a+b\,x)\right]}{d}-$$

$$\frac{b\,h\,n\,\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]\text{PolyLog}\left[2,-\frac{e\,(1-c\,(a+b\,x))}{b\,c\,(d+e\,x)}\right]}{a}+\frac{e\,h\,n\,\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]\text{PolyLog}\left[2,-\frac{e\,(1-c\,(a+b\,x))}{b\,c\,(d+e\,x)}\right]}{d}+$$

$$\frac{b\,h\,n\,\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]\text{PolyLog}\left[2,\frac{(b\,d-a\,e)\,(1-c\,(a+b\,x))}{b\,(d+e\,x)}\right]}{a}-\frac{e\,h\,n\,\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]\text{PolyLog}\left[2,\frac{(b\,d-a\,e)\,(1-c\,(a+b\,x))}{b\,(d+e\,x)}\right]}{d}-$$

$$\frac{e\,h\,n\,\text{PolyLog}\left[3,-\frac{b\,x}{a}\right]}{d}+\frac{b\,h\,n\,\text{PolyLog}\left[3,1-\frac{b\,c\,x}{1-a\,c}\right]}{a}-\frac{b\,h\,n\,\text{PolyLog}\left[3,\frac{d\,(1-a\,c-b\,c\,x)}{(1-a\,c)\,(d+e\,x)}\right]}{a}+\frac{b\,h\,n\,\text{PolyLog}\left[3,-\frac{e\,(1-a\,c-b\,c\,x)}{b\,c\,(d+e\,x)}\right]}{a}-$$

$$\frac{b\,h\,n\,\text{PolyLog}\left[3,\frac{b\,(d+e\,x)}{b\,d-a\,e}\right]}{a}+\frac{e\,h\,n\,\text{PolyLog}\left[3,\frac{b\,(d+e\,x)}{b\,d-a\,e}\right]}{d}+\frac{b\,h\,n\,\text{PolyLog}\left[3,1+\frac{e\,x}{d}\right]}{a}+\frac{e\,h\,n\,\text{PolyLog}\left[3,-\frac{b\,x}{a\,(1-c\,(a+b\,x))}\right]}{d}-$$

$$\frac{e\,h\,n\,\text{PolyLog}\left[3,-\frac{b\,c\,x}{1-c\,(a+b\,x)}\right]}{d}-\frac{b\,h\,n\,\text{PolyLog}\left[3,1-c\,(a+b\,x)\right]}{a}-\frac{b\,h\,n\,\text{PolyLog}\left[3,-\frac{e\,(1-c\,(a+b\,x))}{b\,c\,(d+e\,x)}\right]}{a}+$$

$$\frac{e\,h\,n\,\text{PolyLog}\left[3,-\frac{e\,(1-c\,(a+b\,x))}{b\,c\,(d+e\,x)}\right]}{d}+\frac{b\,h\,n\,\text{PolyLog}\left[3,\frac{(b\,d-a\,e)\,(1-c\,(a+b\,x))}{b\,(d+e\,x)}\right]}{a}-\frac{e\,h\,n\,\text{PolyLog}\left[3,\frac{(b\,d-a\,e)\,(1-c\,(a+b\,x))}{b\,(d+e\,x)}\right]}{d}$$

Result (type 8, 29 leaves):

$$\int\frac{\left(g+h\,\text{Log}\left[f\,(d+e\,x)^n\right]\right)\,\text{PolyLog}[2,c\,(a+b\,x)]}{x^2}\,dx$$

Problem 182: Unable to integrate problem.

$$\int\frac{\left(g+h\,\text{Log}\left[f\,(d+e\,x)^n\right]\right)\,\text{PolyLog}[2,c\,(a+b\,x)]}{x^3}\,dx$$

Optimal (type 4, 3119 leaves, 44 steps):

$$\frac{b^2\,g\,\text{Log}\left[\frac{b\,c\,x}{1-a\,c}\right]\,\text{Log}[1-a\,c-b\,c\,x]}{2\,a^2}-\frac{b\,e\,h\,n\,\text{Log}\left[\frac{b\,c\,x}{1-a\,c}\right]\,\text{Log}[1-a\,c-b\,c\,x]}{a\,d}+\frac{b^2\,h\,n\,\text{Log}\left[\frac{b\,c\,x}{1-a\,c}\right]\,\text{Log}[1-a\,c-b\,c\,x]\,\text{Log}[d+e\,x]}{2\,a^2}+$$

$$\frac{b\,e\,h\,n\,\text{Log}[1-a\,c-b\,c\,x]\,\text{Log}\left[\frac{b\,c\,(d+e\,x)}{b\,c\,d+e-a\,c\,e}\right]}{2\,a\,d}+\frac{b^2\,h\,n\,\left(\text{Log}\left[\frac{b\,c\,x}{1-a\,c}\right]+\text{Log}\left[\frac{b\,c\,d+e-a\,c\,e}{b\,c\,(d+e\,x)}\right]-\text{Log}\left[\frac{(b\,c\,d+e-a\,c\,e)\,x}{(1-a\,c)\,(d+e\,x)}\right]\right)\,\text{Log}\left[\frac{(1-a\,c)\,(d+e\,x)}{d\,(1-a\,c-b\,c\,x)}\right]^2}{4\,a^2}-$$

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

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

$$\frac{b^2\,h\,n\,\left(\text{Log}[c\,(a+b\,x)]+\text{Log}\left[\frac{b\,c\,d+e-a\,c\,e}{b\,c\,(d+e\,x)}\right]-\text{Log}\left[\frac{(b\,c\,d+e-a\,c\,e)\,(a+b\,x)}{b\,(d+e\,x)}\right]\right)\,\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]^2}{4\,a^2}+$$

$$\frac{e^2\,h\,n\,\left(\text{Log}[c\,(a+b\,x)]+\text{Log}\left[\frac{b\,c\,d+e-a\,c\,e}{b\,c\,(d+e\,x)}\right]-\text{Log}\left[\frac{(b\,c\,d+e-a\,c\,e)\,(a+b\,x)}{b\,(d+e\,x)}\right]\right)\,\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]^2}{4\,d^2}-\frac{e^2\,h\,n\,\text{Log}[x]\,\text{Log}\left[1+\frac{b\,x}{a}\right]\,\text{Log}[1-c\,(a+b\,x)]}{2\,d^2}-$$

$$\frac{b^2\,h\,n\,\text{Log}[c\,(a+b\,x)]\,\text{Log}[d+e\,x]\,\text{Log}[1-c\,(a+b\,x)]}{2\,a^2}+\frac{e^2\,h\,n\,\text{Log}[c\,(a+b\,x)]\,\text{Log}[d+e\,x]\,\text{Log}[1-c\,(a+b\,x)]}{2\,d^2}+$$

$$\frac{b^2\,h\,n\,\left(\text{Log}[c\,(a+b\,x)]-\text{Log}\left[-\frac{e\,(a+b\,x)}{b\,d-a\,e}\right]\right)\,\left(\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]+\text{Log}[1-c\,(a+b\,x)]\right)^2}{4\,a^2}-$$

$$\frac{e^2\,h\,n\,\left(\text{Log}[c\,(a+b\,x)]-\text{Log}\left[-\frac{e\,(a+b\,x)}{b\,d-a\,e}\right]\right)\,\left(\text{Log}\left[\frac{b\,(d+e\,x)}{(b\,d-a\,e)\,(1-c\,(a+b\,x))}\right]+\text{Log}[1-c\,(a+b\,x)]\right)^2}{4\,d^2}-$$

$$\frac{e^2 h n \left(\mathrm{Log}\left[1+\frac{b x}{a}\right]+\mathrm{Log}\left[\frac{1-a c}{1-c (a+b x)}\right]-\mathrm{Log}\left[\frac{(1-a c) (a+b x)}{a (1-c (a+b x))}\right]\right) \mathrm{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right]^2}{4 d^2}-$$

$$\frac{e^2 h n \left(\mathrm{Log}[c (a+b x)]-\mathrm{Log}\left[1+\frac{b x}{a}\right]\right) \left(\mathrm{Log}[x]+\mathrm{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right]\right)^2}{4 d^2}-\frac{e^2 h n \left(\mathrm{Log}[1-c (a+b x)]-\mathrm{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right]\right) \mathrm{PolyLog}\left[2,-\frac{b x}{a}\right]}{2 d^2}+$$

$$\frac{b^2 g\, \mathrm{PolyLog}[2,c (a+b x)]}{2 a^2}-\frac{b e h n\, \mathrm{PolyLog}[2,c (a+b x)]}{2 a d}-\frac{e h n\, \mathrm{PolyLog}[2,c (a+b x)]}{2 d x}-\frac{e^2 h n\, \mathrm{Log}[x]\, \mathrm{PolyLog}[2,c (a+b x)]}{2 d^2}+$$

$$\frac{e^2 h n\, \mathrm{Log}[d+e x]\, \mathrm{PolyLog}[2,c (a+b x)]}{2 d^2}-\frac{b^2 h \left(n \mathrm{Log}[d+e x]-\mathrm{Log}\left[f (d+e x)^n\right]\right) \mathrm{PolyLog}[2,c (a+b x)]}{2 a^2}-$$

$$\frac{\left(g+h \mathrm{Log}\left[f (d+e x)^n\right]\right) \mathrm{PolyLog}[2,c (a+b x)]}{2 x^2}+\frac{b e h n\, \mathrm{PolyLog}\left[2,\frac{e (1-a c-b c x)}{b c d+e-a c e}\right]}{2 a d}+\frac{b^2 g\, \mathrm{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{2 a^2}-$$

$$\frac{b e h n\, \mathrm{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{a d}+\frac{b^2 h n \left(\mathrm{Log}[d+e x]-\mathrm{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right]\right) \mathrm{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{2 a^2}-$$

$$\frac{b^2 h \left(n \mathrm{Log}[d+e x]-\mathrm{Log}\left[f (d+e x)^n\right]\right) \mathrm{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{2 a^2}+\frac{b^2 h n\, \mathrm{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right] \mathrm{PolyLog}\left[2,\frac{d (1-a c-b c x)}{(1-a c) (d+e x)}\right]}{2 a^2}-$$

$$\frac{b^2 h n\, \mathrm{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right] \mathrm{PolyLog}\left[2,-\frac{e (1-a c-b c x)}{b c (d+e x)}\right]}{2 a^2}-\frac{b^2 h n \left(\mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right]+\mathrm{Log}[1-c (a+b x)]\right) \mathrm{PolyLog}\left[2,\frac{b (d+e x)}{b d-a e}\right]}{2 a^2}+$$

$$\frac{e^2 h n \left(\mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right]+\mathrm{Log}[1-c (a+b x)]\right) \mathrm{PolyLog}\left[2,\frac{b (d+e x)}{b d-a e}\right]}{2 d^2}-\frac{b^2 c h n\, \mathrm{PolyLog}\left[2,\frac{b c (d+e x)}{b c d+e-a c e}\right]}{2 a (1-a c)}+\frac{b^2 c h n\, \mathrm{PolyLog}\left[2,1+\frac{e x}{d}\right]}{2 a (1-a c)}+$$

$$\frac{b^2 h n \left(\mathrm{Log}[1-a c-b c x]+\mathrm{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right]\right) \mathrm{PolyLog}\left[2,1+\frac{e x}{d}\right]}{2 a^2}-\frac{e^2 h n\, \mathrm{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right] \mathrm{PolyLog}\left[2,-\frac{b x}{a (1-c (a+b x))}\right]}{2 d^2}+$$

$$\frac{e^2 h n\, \mathrm{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right] \mathrm{PolyLog}\left[2,-\frac{b c x}{1-c (a+b x)}\right]}{2 d^2}-\frac{b^2 h n \left(\mathrm{Log}[d+e x]-\mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right]\right) \mathrm{PolyLog}[2,1-c (a+b x)]}{2 a^2}+$$

$$\frac{e^2 h n \left(\mathrm{Log}[d+e x]-\mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right]\right) \mathrm{PolyLog}[2,1-c (a+b x)]}{2 d^2}-\frac{e^2 h n \left(\mathrm{Log}[x]+\mathrm{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right]\right) \mathrm{PolyLog}[2,1-c (a+b x)]}{2 d^2}+$$

$$\frac{b^2 h n\, \mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \mathrm{PolyLog}\left[2,-\frac{e (1-c (a+b x))}{b c (d+e x)}\right]}{2 a^2}-\frac{e^2 h n\, \mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \mathrm{PolyLog}\left[2,-\frac{e (1-c (a+b x))}{b c (d+e x)}\right]}{2 d^2}-$$

$$\frac{b^2 h n\, \mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \mathrm{PolyLog}\left[2,\frac{(b d-a e) (1-c (a+b x))}{b (d+e x)}\right]}{2 a^2}+\frac{e^2 h n\, \mathrm{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \mathrm{PolyLog}\left[2,\frac{(b d-a e) (1-c (a+b x))}{b (d+e x)}\right]}{2 d^2}+$$

$$\frac{e^2 h n\, \mathrm{PolyLog}\left[3,-\frac{b x}{a}\right]}{2 d^2}-\frac{b^2 h n\, \mathrm{PolyLog}\left[3,1-\frac{b c x}{1-a c}\right]}{2 a^2}+\frac{b^2 h n\, \mathrm{PolyLog}\left[3,\frac{d (1-a c-b c x)}{(1-a c) (d+e x)}\right]}{2 a^2}-\frac{b^2 h n\, \mathrm{PolyLog}\left[3,-\frac{e (1-a c-b c x)}{b c (d+e x)}\right]}{2 a^2}+$$

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

Result (type 8, 29 leaves):

$$\int \frac{\left(g+h \text{Log}\left[f (d+e x)^n\right]\right) \text{PolyLog}[2, c (a+b x)]}{x^3} \, dx$$

Problem 183: Unable to integrate problem.

$$\int \frac{\left(g+h \text{Log}\left[f (d+e x)^n\right]\right) \text{PolyLog}[2, c (a+b x)]}{x^4} \, dx$$

Optimal (type 4, 3733 leaves, 78 steps):

$$\frac{b^2 c e h n \text{Log}[x]}{2 a (1-a c) d}-\frac{b^2 c e h n \text{Log}[1-a c-b c x]}{3 a (1-a c) d}+\frac{b e h n \text{Log}[1-a c-b c x]}{3 a d x}-$$
$$\frac{b^3 g \text{Log}\left[\frac{b c x}{1-a c}\right] \text{Log}[1-a c-b c x]}{3 a^3}+\frac{b^2 e h n \text{Log}\left[\frac{b c x}{1-a c}\right] \text{Log}[1-a c-b c x]}{2 a^2 d}+\frac{b e^2 h n \text{Log}\left[\frac{b c x}{1-a c}\right] \text{Log}[1-a c-b c x]}{2 a d^2}-$$
$$\frac{b^2 c e h n \text{Log}[d+e x]}{6 a (1-a c) d}-\frac{b^3 h n \text{Log}\left[\frac{b c x}{1-a c}\right] \text{Log}[1-a c-b c x] \text{Log}[d+e x]}{3 a^3}-\frac{b^2 e h n \text{Log}[1-a c-b c x] \text{Log}\left[\frac{b c (d+e x)}{b c d+e-a c e}\right]}{3 a^2 d}-$$
$$\frac{b e^2 h n \text{Log}[1-a c-b c x] \text{Log}\left[\frac{b c (d+e x)}{b c d+e-a c e}\right]}{6 a d^2}-\frac{b^3 h n \left(\text{Log}\left[\frac{b c x}{1-a c}\right]+\text{Log}\left[\frac{b c d+e-a c e}{b c (d+e x)}\right]-\text{Log}\left[\frac{(b c d+e-a c e) x}{(1-a c) (d+e x)}\right]\right) \text{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right]^2}{6 a^3}+$$
$$\frac{b^3 h n \left(\text{Log}\left[\frac{b c x}{1-a c}\right]-\text{Log}\left[-\frac{e x}{d}\right]\right) \left(\text{Log}[1-a c-b c x]+\text{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right]\right)^2}{6 a^3}+\frac{b^3 h \text{Log}\left[\frac{b c x}{1-a c}\right] \text{Log}[1-a c-b c x] \left(n \text{Log}[d+e x]-\text{Log}\left[f (d+e x)^n\right]\right)}{3 a^3}-$$
$$\frac{b^2 c \left(g+h \text{Log}\left[f (d+e x)^n\right]\right)}{6 a (1-a c) x}+\frac{b^3 c^2 \text{Log}\left[-\frac{e x}{d}\right] \left(g+h \text{Log}\left[f (d+e x)^n\right]\right)}{6 a (1-a c)^2}-\frac{b^3 c \text{Log}\left[-\frac{e x}{d}\right] \left(g+h \text{Log}\left[f (d+e x)^n\right]\right)}{3 a^2 (1-a c)}+$$
$$\frac{b \text{Log}[1-a c-b c x] \left(g+h \text{Log}\left[f (d+e x)^n\right]\right)}{6 a x^2}-\frac{b^2 \text{Log}[1-a c-b c x] \left(g+h \text{Log}\left[f (d+e x)^n\right]\right)}{3 a^2 x}-\frac{b^3 c^2 \text{Log}\left[\frac{e (1-a c-b c x)}{b c d+e-a c e}\right] \left(g+h \text{Log}\left[f (d+e x)^n\right]\right)}{6 a (1-a c)^2}+$$

$$\frac{b^3 c\,\text{Log}\left[\frac{e\,(1-a c-b c x)}{b c d+e-a c e}\right]\left(g+h\,\text{Log}\left[f\,(d+e x)^n\right]\right)}{3 a^2\,(1-a c)}+\frac{b^3 h n\left(\text{Log}[c\,(a+b x)]+\text{Log}\left[\frac{b c d+e-a c e}{b c\,(d+e x)}\right]-\text{Log}\left[\frac{(b c d+e-a c e)\,(a+b x)}{b\,(d+e x)}\right]\right)\text{Log}\left[\frac{b\,(d+e x)}{(b d-a e)\,(1-c\,(a+b x))}\right]^2}{6 a^3}-$$

$$\frac{e^3 h n\left(\text{Log}[c\,(a+b x)]+\text{Log}\left[\frac{b c d+e-a c e}{b c\,(d+e x)}\right]-\text{Log}\left[\frac{(b c d+e-a c e)\,(a+b x)}{b\,(d+e x)}\right]\right)\text{Log}\left[\frac{b\,(d+e x)}{(b d-a e)\,(1-c\,(a+b x))}\right]^2}{6 d^3}+\frac{e^3 h n\,\text{Log}[x]\,\text{Log}\left[1+\frac{b x}{a}\right]\text{Log}[1-c\,(a+b x)]}{3 d^3}+$$

$$\frac{b^3 h n\,\text{Log}[c\,(a+b x)]\,\text{Log}[d+e x]\,\text{Log}[1-c\,(a+b x)]}{3 a^3}-\frac{e^3 h n\,\text{Log}[c\,(a+b x)]\,\text{Log}[d+e x]\,\text{Log}[1-c\,(a+b x)]}{3 d^3}-$$

$$\frac{b^3 h n\left(\text{Log}[c\,(a+b x)]-\text{Log}\left[-\frac{e\,(a+b x)}{b d-a e}\right]\right)\left(\text{Log}\left[\frac{b\,(d+e x)}{(b d-a e)\,(1-c\,(a+b x))}\right]+\text{Log}[1-c\,(a+b x)]\right)^2}{6 a^3}+$$

$$\frac{e^3 h n\left(\text{Log}[c\,(a+b x)]-\text{Log}\left[-\frac{e\,(a+b x)}{b d-a e}\right]\right)\left(\text{Log}\left[\frac{b\,(d+e x)}{(b d-a e)\,(1-c\,(a+b x))}\right]+\text{Log}[1-c\,(a+b x)]\right)^2}{6 d^3}+$$

$$\frac{e^3 h n\left(\text{Log}\left[1+\frac{b x}{a}\right]+\text{Log}\left[\frac{1-a c}{1-c\,(a+b x)}\right]-\text{Log}\left[\frac{(1-a c)\,(a+b x)}{a\,(1-c\,(a+b x))}\right]\right)\text{Log}\left[-\frac{a\,(1-c\,(a+b x))}{b x}\right]^2}{6 d^3}+$$

$$\frac{e^3 h n\left(\text{Log}[c\,(a+b x)]-\text{Log}\left[1+\frac{b x}{a}\right]\right)\left(\text{Log}[x]+\text{Log}\left[-\frac{a\,(1-c\,(a+b x))}{b x}\right]\right)^2}{6 d^3}+\frac{e^3 h n\left(\text{Log}[1-c\,(a+b x)]-\text{Log}\left[-\frac{a\,(1-c\,(a+b x))}{b x}\right]\right)\text{PolyLog}\left[2,-\frac{b x}{a}\right]}{3 d^3}-$$

$$\frac{b^3 g\,\text{PolyLog}[2,c\,(a+b x)]}{3 a^3}+\frac{b^2 e h n\,\text{PolyLog}[2,c\,(a+b x)]}{6 a^2 d}+\frac{b e^2 h n\,\text{PolyLog}[2,c\,(a+b x)]}{3 a d^2}-\frac{e h n\,\text{PolyLog}[2,c\,(a+b x)]}{6 d x^2}+$$

$$\frac{e^2 h n\,\text{PolyLog}[2,c\,(a+b x)]}{3 d^2 x}+\frac{e^3 h n\,\text{Log}[x]\,\text{PolyLog}[2,c\,(a+b x)]}{3 d^3}-\frac{e^3 h n\,\text{Log}[d+e x]\,\text{PolyLog}[2,c\,(a+b x)]}{3 d^3}+$$

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

$$\frac{b^2 e h n\,\text{PolyLog}\left[2,\frac{e\,(1-a c-b c x)}{b c d+e-a c e}\right]}{3 a^2 d}-\frac{b e^2 h n\,\text{PolyLog}\left[2,\frac{e\,(1-a c-b c x)}{b c d+e-a c e}\right]}{6 a d^2}-\frac{b^3 g\,\text{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{3 a^3}+$$

$$\frac{b^2 e h n\,\text{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{2 a^2 d}+\frac{b e^2 h n\,\text{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{2 a d^2}-\frac{b^3 h n\left(\text{Log}[d+e x]-\text{Log}\left[\frac{(1-a c)\,(d+e x)}{d\,(1-a c-b c x)}\right]\right)\text{PolyLog}\left[2,1-\frac{b c x}{1-a c}\right]}{3 a^3}+$$

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

$$\frac{b^3 h n\,\text{Log}\left[\frac{(1-a c)\,(d+e x)}{d\,(1-a c-b c x)}\right]\text{PolyLog}\left[2,-\frac{e\,(1-a c-b c x)}{b c\,(d+e x)}\right]}{3 a^3}+\frac{b^3 h n\left(\text{Log}\left[\frac{b\,(d+e x)}{(b d-a e)\,(1-c\,(a+b x))}\right]+\text{Log}[1-c\,(a+b x)]\right)\text{PolyLog}\left[2,\frac{b\,(d+e x)}{b d-a e}\right]}{3 a^3}-$$

$$\frac{e^3 h n\left(\text{Log}\left[\frac{b\,(d+e x)}{(b d-a e)\,(1-c\,(a+b x))}\right]+\text{Log}[1-c\,(a+b x)]\right)\text{PolyLog}\left[2,\frac{b\,(d+e x)}{b d-a e}\right]}{3 d^3}-\frac{b^3 c^2 h n\,\text{PolyLog}\left[2,\frac{b c\,(d+e x)}{b c d+e-a c e}\right]}{6 a\,(1-a c)^2}+$$

$$\frac{b^3 c h n \text{PolyLog}\left[2,\frac{b c (d+e x)}{b c d+e-a c e}\right]}{3 a^2 (1-a c)}+\frac{b^3 c^2 h n \text{PolyLog}\left[2,1+\frac{e x}{d}\right]}{6 a (1-a c)^2}-\frac{b^3 c h n \text{PolyLog}\left[2,1+\frac{e x}{d}\right]}{3 a^2 (1-a c)}-$$

$$\frac{b^3 h n \left(\text{Log}[1-a c-b c x]+\text{Log}\left[\frac{(1-a c) (d+e x)}{d (1-a c-b c x)}\right]\right) \text{PolyLog}\left[2,1+\frac{e x}{d}\right]}{3 a^3}+\frac{e^3 h n \text{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right] \text{PolyLog}\left[2,-\frac{b x}{a (1-c (a+b x))}\right]}{3 d^3}-$$

$$\frac{e^3 h n \text{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right] \text{PolyLog}\left[2,-\frac{b c x}{1-c (a+b x)}\right]}{3 d^3}+\frac{b^3 h n \left(\text{Log}[d+e x]-\text{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right]\right) \text{PolyLog}[2,1-c (a+b x)]}{3 a^3}-$$

$$\frac{e^3 h n \left(\text{Log}[d+e x]-\text{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right]\right) \text{PolyLog}[2,1-c (a+b x)]}{3 d^3}+\frac{e^3 h n \left(\text{Log}[x]+\text{Log}\left[-\frac{a (1-c (a+b x))}{b x}\right]\right) \text{PolyLog}[2,1-c (a+b x)]}{3 d^3}-$$

$$\frac{b^3 h n \text{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \text{PolyLog}\left[2,-\frac{e (1-c (a+b x))}{b c (d+e x)}\right]}{3 a^3}+\frac{e^3 h n \text{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \text{PolyLog}\left[2,-\frac{e (1-c (a+b x))}{b c (d+e x)}\right]}{3 d^3}+$$

$$\frac{b^3 h n \text{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \text{PolyLog}\left[2,\frac{(b d-a e) (1-c (a+b x))}{b (d+e x)}\right]}{3 a^3}-\frac{e^3 h n \text{Log}\left[\frac{b (d+e x)}{(b d-a e) (1-c (a+b x))}\right] \text{PolyLog}\left[2,\frac{(b d-a e) (1-c (a+b x))}{b (d+e x)}\right]}{3 d^3}-$$

$$\frac{e^3 h n \text{PolyLog}\left[3,-\frac{b x}{a}\right]}{3 d^3}+\frac{b^3 h n \text{PolyLog}\left[3,1-\frac{b c x}{1-a c}\right]}{3 a^3}-\frac{b^3 h n \text{PolyLog}\left[3,\frac{d (1-a c-b c x)}{(1-a c) (d+e x)}\right]}{3 a^3}+\frac{b^3 h n \text{PolyLog}\left[3,-\frac{e (1-a c-b c x)}{b c (d+e x)}\right]}{3 a^3}-$$

$$\frac{b^3 h n \text{PolyLog}\left[3,\frac{b (d+e x)}{b d-a e}\right]}{3 a^3}+\frac{e^3 h n \text{PolyLog}\left[3,\frac{b (d+e x)}{b d-a e}\right]}{3 d^3}+\frac{b^3 h n \text{PolyLog}\left[3,1+\frac{e x}{d}\right]}{3 a^3}+\frac{e^3 h n \text{PolyLog}\left[3,-\frac{b x}{a (1-c (a+b x))}\right]}{3 d^3}-$$

$$\frac{e^3 h n \text{PolyLog}\left[3,-\frac{b c x}{1-c (a+b x)}\right]}{3 d^3}-\frac{b^3 h n \text{PolyLog}[3,1-c (a+b x)]}{3 a^3}-\frac{b^3 h n \text{PolyLog}\left[3,-\frac{e (1-c (a+b x))}{b c (d+e x)}\right]}{3 a^3}+$$

$$\frac{e^3 h n \text{PolyLog}\left[3,-\frac{e (1-c (a+b x))}{b c (d+e x)}\right]}{3 d^3}+\frac{b^3 h n \text{PolyLog}\left[3,\frac{(b d-a e) (1-c (a+b x))}{b (d+e x)}\right]}{3 a^3}-\frac{e^3 h n \text{PolyLog}\left[3,\frac{(b d-a e) (1-c (a+b x))}{b (d+e x)}\right]}{3 d^3}$$

Result (type 8, 29 leaves) :

$$\int \frac{\left(g+h \text{Log}\left[f (d+e x)^n\right]\right) \text{PolyLog}[2,c (a+b x)]}{x^4} \, dx$$

Problem 196: Unable to integrate problem.

$$\int \frac{\left(a+b x+c x^2\right) \text{Log}[1-d x] \text{PolyLog}[2,d x]}{x^3} \, dx$$

Optimal (type 4, 343 leaves, 32 steps) :

$$-a d^2 \text{Log}[x] + a d^2 \text{Log}[1-d x] - \frac{a d \text{Log}[1-d x]}{x} - \frac{1}{4} a d^2 \text{Log}[1-d x]^2 + \frac{a \text{Log}[1-d x]^2}{4 x^2} + \frac{b (1-d x) \text{Log}[1-d x]^2}{x} - \frac{b^2 \text{Log}[d x] \text{Log}[1-d x]^2}{2 a} + \frac{(b+a d)^2 \text{Log}[d x] \text{Log}[1-d x]^2}{2 a} - 2 b d \text{PolyLog}[2, d x] - \frac{1}{2} a d^2 \text{PolyLog}[2, d x] + \frac{a d \text{PolyLog}[2, d x]}{2 x} + \frac{(b+a d)^2 \text{Log}[1-d x] \text{PolyLog}[2, d x]}{2 a} - \frac{(a+b x)^2 \text{Log}[1-d x] \text{PolyLog}[2, d x]}{2 a x^2} - \frac{1}{2} c \text{PolyLog}[2, d x]^2 - \frac{b^2 \text{Log}[1-d x] \text{PolyLog}[2, 1-d x]}{a} + \frac{(b+a d)^2 \text{Log}[1-d x] \text{PolyLog}[2, 1-d x]}{a} - \frac{1}{2} d (2 b + a d) \text{PolyLog}[3, d x] + \frac{b^2 \text{PolyLog}[3, 1-d x]}{a} - \frac{(b+a d)^2 \text{PolyLog}[3, 1-d x]}{a}$$

Result (type 8, 28 leaves):

$$\int \frac{(a+b x+c x^2) \text{Log}[1-d x] \text{PolyLog}[2, d x]}{x^3} \, dx$$

Test results for the 398 problems in "8.9 Product logarithm function.m"

Problem 159: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]}{x^3} \, dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$\frac{1}{2} a \text{ExpIntegralEi}[-\text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]}{2 x^2}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{ProductLog}[a x^2]}{x^3} \, dx$$

Problem 161: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]}{x^5} \, dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$-\frac{1}{2} a^2 \text{ExpIntegralEi}[-2 \text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]}{2 x^4}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{ProductLog}\left[a\,x^2\right]}{x^5}\,dx$$

Problem 163: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a\,x^2\right]}{x^7}\,dx$$

Optimal (type 4, 45 leaves, 3 steps):

$$\frac{3}{4}\,a^3\,\text{ExpIntegralEi}\left[-3\,\text{ProductLog}\left[a\,x^2\right]\right]-\frac{\text{ProductLog}\left[a\,x^2\right]}{4\,x^6}+\frac{\text{ProductLog}\left[a\,x^2\right]^2}{4\,x^6}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{ProductLog}\left[a\,x^2\right]}{x^7}\,dx$$

Problem 170: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a\,x^2\right]^2}{x^3}\,dx$$

Optimal (type 4, 27 leaves, 2 steps):

$$-\frac{\text{ProductLog}\left[a\,x^2\right]}{x^2}-\frac{\text{ProductLog}\left[a\,x^2\right]^2}{2\,x^2}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[a\,x^2\right]^2}{x^3}\,dx$$

Problem 172: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a\,x^2\right]^2}{x^5}\,dx$$

Optimal (type 4, 32 leaves, 2 steps):

$$\frac{1}{2} a^2 \text{ExpIntegralEi}\left[-2 \text{ProductLog}\left[a x^2\right]\right] - \frac{\text{ProductLog}\left[a x^2\right]^2}{4 x^4}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[a x^2\right]^2}{x^5} \, dx$$

Problem 174: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a x^2\right]^2}{x^7} \, dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$-a^3 \text{ExpIntegralEi}\left[-3 \text{ProductLog}\left[a x^2\right]\right] - \frac{\text{ProductLog}\left[a x^2\right]^2}{2 x^6}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[a x^2\right]^2}{x^7} \, dx$$

Problem 176: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a x^2\right]^2}{x^9} \, dx$$

Optimal (type 4, 45 leaves, 3 steps):

$$2 a^4 \text{ExpIntegralEi}\left[-4 \text{ProductLog}\left[a x^2\right]\right] - \frac{\text{ProductLog}\left[a x^2\right]^2}{4 x^8} + \frac{\text{ProductLog}\left[a x^2\right]^3}{2 x^8}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[a x^2\right]^2}{x^9} \, dx$$

Problem 182: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a x^2\right]^3}{x^3} \, dx$$

Optimal (type 4, 44 leaves, 3 steps):

$$-\frac{3\,\text{ProductLog}[a\,x^2]}{2\,x^2}-\frac{3\,\text{ProductLog}[a\,x^2]^2}{2\,x^2}-\frac{\text{ProductLog}[a\,x^2]^3}{2\,x^2}$$

Result (type 8, 14 leaves):

$$\int\frac{\text{ProductLog}[a\,x^2]^3}{x^3}\,dx$$

Problem 184: Unable to integrate problem.

$$\int\frac{\text{ProductLog}[a\,x^2]^3}{x^5}\,dx$$

Optimal (type 4, 31 leaves, 2 steps):

$$-\frac{3\,\text{ProductLog}[a\,x^2]^2}{8\,x^4}-\frac{\text{ProductLog}[a\,x^2]^3}{4\,x^4}$$

Result (type 8, 14 leaves):

$$\int\frac{\text{ProductLog}[a\,x^2]^3}{x^5}\,dx$$

Problem 186: Unable to integrate problem.

$$\int\frac{\text{ProductLog}[a\,x^2]^3}{x^7}\,dx$$

Optimal (type 4, 32 leaves, 2 steps):

$$\frac{1}{2}\,a^3\,\text{ExpIntegralEi}[-3\,\text{ProductLog}[a\,x^2]]-\frac{\text{ProductLog}[a\,x^2]^3}{6\,x^6}$$

Result (type 8, 14 leaves):

$$\int\frac{\text{ProductLog}[a\,x^2]^3}{x^7}\,dx$$

Problem 188: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a x^2\right]^3}{x^9}\, dx$$

Optimal (type 4, 32 leaves, 2 steps):

$$-\frac{3}{2} a^4 \,\text{ExpIntegralEi}\left[-4\, \text{ProductLog}\left[a x^2\right]\right]-\frac{\text{ProductLog}\left[a x^2\right]^3}{2 x^8}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[a x^2\right]^3}{x^9}\, dx$$

Problem 197: Unable to integrate problem.

$$\int \frac{1}{x^3\, \text{ProductLog}\left[a x^2\right]}\, dx$$

Optimal (type 4, 37 leaves, 4 steps):

$$-\frac{1}{4 x^2}-\frac{1}{4} a\, \text{ExpIntegralEi}\left[-\text{ProductLog}\left[a x^2\right]\right]-\frac{1}{4 x^2\, \text{ProductLog}\left[a x^2\right]}$$

Result (type 8, 14 leaves):

$$\int \frac{1}{x^3\, \text{ProductLog}\left[a x^2\right]}\, dx$$

Problem 199: Unable to integrate problem.

$$\int \frac{1}{x^5\, \text{ProductLog}\left[a x^2\right]}\, dx$$

Optimal (type 4, 52 leaves, 5 steps):

$$-\frac{1}{12 x^4}+\frac{1}{3} a^2\, \text{ExpIntegralEi}\left[-2\, \text{ProductLog}\left[a x^2\right]\right]-\frac{1}{6 x^4\, \text{ProductLog}\left[a x^2\right]}+\frac{\text{ProductLog}\left[a x^2\right]}{6 x^4}$$

Result (type 8, 14 leaves):

$$\int \frac{1}{x^5 \, \text{ProductLog}\left[a\, x^2\right]} \, dx$$

Problem 210: Unable to integrate problem.

$$\int \frac{1}{x^3 \, \text{ProductLog}\left[a\, x^2\right]^2} \, dx$$

Optimal (type 4, 52 leaves, 5 steps):

$$\frac{1}{6\, x^2} + \frac{1}{6}\, a\, \text{ExpIntegralEi}\left[-\text{ProductLog}\left[a\, x^2\right]\right] - \frac{1}{6\, x^2\, \text{ProductLog}\left[a\, x^2\right]^2} - \frac{1}{6\, x^2\, \text{ProductLog}\left[a\, x^2\right]}$$

Result (type 8, 14 leaves):

$$\int \frac{1}{x^3 \, \text{ProductLog}\left[a\, x^2\right]^2} \, dx$$

Problem 212: Unable to integrate problem.

$$\int x^6 \sqrt{c\, \text{ProductLog}\left[a\, x^2\right]} \, dx$$

Optimal (type 4, 106 leaves, 5 steps):

$$\frac{48\, c^4\, x^7}{16\,807\, \left(c\, \text{ProductLog}\left[a\, x^2\right]\right)^{7/2}} - \frac{24\, c^3\, x^7}{2401\, \left(c\, \text{ProductLog}\left[a\, x^2\right]\right)^{5/2}} + \frac{6\, c^2\, x^7}{343\, \left(c\, \text{ProductLog}\left[a\, x^2\right]\right)^{3/2}} - \frac{c\, x^7}{49\, \sqrt{c\, \text{ProductLog}\left[a\, x^2\right]}} + \frac{1}{7}\, x^7\, \sqrt{c\, \text{ProductLog}\left[a\, x^2\right]}$$

Result (type 8, 18 leaves):

$$\int x^6 \sqrt{c\, \text{ProductLog}\left[a\, x^2\right]} \, dx$$

Problem 214: Unable to integrate problem.

$$\int x^4 \sqrt{c\, \text{ProductLog}\left[a\, x^2\right]} \, dx$$

Optimal (type 4, 84 leaves, 4 steps):

$$-\frac{8 c^3 x^5}{625 \left(c \,\text{ProductLog}\left[a x^2\right]\right)^{5/2}}+\frac{4 c^2 x^5}{125 \left(c \,\text{ProductLog}\left[a x^2\right]\right)^{3/2}}-\frac{c x^5}{25 \sqrt{c \,\text{ProductLog}\left[a x^2\right]}}+\frac{1}{5} x^5 \sqrt{c \,\text{ProductLog}\left[a x^2\right]}$$

Result (type 8, 18 leaves) :

$$\int x^4 \sqrt{c \,\text{ProductLog}\left[a x^2\right]} \, dx$$

Problem 216: Unable to integrate problem.

$$\int x^2 \sqrt{c \,\text{ProductLog}\left[a x^2\right]} \, dx$$

Optimal (type 4, 62 leaves, 3 steps) :

$$\frac{2 c^2 x^3}{27 \left(c \,\text{ProductLog}\left[a x^2\right]\right)^{3/2}}-\frac{c x^3}{9 \sqrt{c \,\text{ProductLog}\left[a x^2\right]}}+\frac{1}{3} x^3 \sqrt{c \,\text{ProductLog}\left[a x^2\right]}$$

Result (type 8, 18 leaves) :

$$\int x^2 \sqrt{c \,\text{ProductLog}\left[a x^2\right]} \, dx$$

Problem 218: Unable to integrate problem.

$$\int \sqrt{c \,\text{ProductLog}\left[a x^2\right]} \, dx$$

Optimal (type 4, 31 leaves, 2 steps) :

$$-\frac{c x}{\sqrt{c \,\text{ProductLog}\left[a x^2\right]}}+x \sqrt{c \,\text{ProductLog}\left[a x^2\right]}$$

Result (type 8, 14 leaves) :

$$\int \sqrt{c \,\text{ProductLog}\left[a x^2\right]} \, dx$$

Problem 221: Unable to integrate problem.

$$\int \frac{\sqrt{c \,\text{ProductLog}\left[a x^2\right]}}{x^3} \, dx$$

Optimal (type 4, 52 leaves, 2 steps) :

$$-\frac{1}{2} a \sqrt{c} \sqrt{\pi}\ \text{Erf}\left[\frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{\sqrt{c}}\right]-\frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{x^2}$$

Result (type 8, 18 leaves):

$$\int \frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{x^3} \, dx$$

Problem 223: Unable to integrate problem.

$$\int \frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{x^5} \, dx$$

Optimal (type 4, 85 leaves, 3 steps):

$$\frac{1}{3} a^2 \sqrt{c} \sqrt{2 \pi}\ \text{Erf}\left[\frac{\sqrt{2} \sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{\sqrt{c}}\right]-\frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{3 x^4}+\frac{\left(c\ \text{ProductLog}\left[a x^2\right]\right)^{3/2}}{3 c x^4}$$

Result (type 8, 18 leaves):

$$\int \frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{x^5} \, dx$$

Problem 225: Unable to integrate problem.

$$\int \frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{x^7} \, dx$$

Optimal (type 4, 107 leaves, 4 steps):

$$-\frac{2}{5} a^3 \sqrt{c} \sqrt{3 \pi}\ \text{Erf}\left[\frac{\sqrt{3} \sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{\sqrt{c}}\right]-\frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{5 x^6}+\frac{\left(c\ \text{ProductLog}\left[a x^2\right]\right)^{3/2}}{15 c x^6}-\frac{2 \left(c\ \text{ProductLog}\left[a x^2\right]\right)^{5/2}}{5 c^2 x^6}$$

Result (type 8, 18 leaves):

$$\int \frac{\sqrt{c\ \text{ProductLog}\left[a x^2\right]}}{x^7} \, dx$$

Problem 227: Unable to integrate problem.

$$\int \frac{x^6}{\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}\,dx$$

Optimal (type 4, 84 leaves, 4 steps):

$$\frac{8\,c^3\,x^7}{2401\,\left(c\,\text{ProductLog}\left[a\,x^2\right]\right)^{7/2}}-\frac{4\,c^2\,x^7}{343\,\left(c\,\text{ProductLog}\left[a\,x^2\right]\right)^{5/2}}+\frac{c\,x^7}{49\,\left(c\,\text{ProductLog}\left[a\,x^2\right]\right)^{3/2}}+\frac{x^7}{7\,\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}$$

Result (type 8, 18 leaves):

$$\int \frac{x^6}{\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}\,dx$$

Problem 229: Unable to integrate problem.

$$\int \frac{x^4}{\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}\,dx$$

Optimal (type 4, 62 leaves, 3 steps):

$$-\frac{2\,c^2\,x^5}{125\,\left(c\,\text{ProductLog}\left[a\,x^2\right]\right)^{5/2}}+\frac{c\,x^5}{25\,\left(c\,\text{ProductLog}\left[a\,x^2\right]\right)^{3/2}}+\frac{x^5}{5\,\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}$$

Result (type 8, 18 leaves):

$$\int \frac{x^4}{\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}\,dx$$

Problem 231: Unable to integrate problem.

$$\int \frac{x^2}{\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}\,dx$$

Optimal (type 4, 40 leaves, 2 steps):

$$\frac{c\,x^3}{9\,\left(c\,\text{ProductLog}\left[a\,x^2\right]\right)^{3/2}}+\frac{x^3}{3\,\sqrt{c\,\text{ProductLog}\left[a\,x^2\right]}}$$

Result (type 8, 18 leaves):

$$\int \frac{x^2}{\sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Problem 236: Unable to integrate problem.

$$\int \frac{1}{x^3\sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Optimal (type 4, 76 leaves, 3 steps):

$$-\frac{a\sqrt{\pi}\,\text{Erf}\left[\frac{\sqrt{c\,\text{ProductLog}[a\,x^2]}}{\sqrt{c}}\right]}{3\sqrt{c}}-\frac{1}{3\,x^2\sqrt{c\,\text{ProductLog}[a\,x^2]}}-\frac{\sqrt{c\,\text{ProductLog}[a\,x^2]}}{3\,c\,x^2}$$

Result (type 8, 18 leaves):

$$\int \frac{1}{x^3\sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Problem 238: Unable to integrate problem.

$$\int \frac{1}{x^5\sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Optimal (type 4, 107 leaves, 4 steps):

$$\frac{4\,a^2\sqrt{2\,\pi}\,\text{Erf}\left[\frac{\sqrt{2}\sqrt{c\,\text{ProductLog}[a\,x^2]}}{\sqrt{c}}\right]}{15\sqrt{c}}-\frac{1}{5\,x^4\sqrt{c\,\text{ProductLog}[a\,x^2]}}-\frac{\sqrt{c\,\text{ProductLog}[a\,x^2]}}{15\,c\,x^4}+\frac{4\,(c\,\text{ProductLog}[a\,x^2])^{3/2}}{15\,c^2\,x^4}$$

Result (type 8, 18 leaves):

$$\int \frac{1}{x^5\sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Problem 240: Unable to integrate problem.

$$\int \frac{1}{x^7 \sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Optimal (type 4, 129 leaves, 5 steps):

$$-\frac{12\,a^3\,\sqrt{3\,\pi}\,\text{Erf}\left[\frac{\sqrt{3}\,\sqrt{c\,\text{ProductLog}[a\,x^2]}}{\sqrt{c}}\right]}{35\,\sqrt{c}}-\frac{1}{7\,x^6\,\sqrt{c\,\text{ProductLog}[a\,x^2]}}-\frac{\sqrt{c\,\text{ProductLog}[a\,x^2]}}{35\,c\,x^6}+\frac{2\,(c\,\text{ProductLog}[a\,x^2])^{3/2}}{35\,c^2\,x^6}-\frac{12\,(c\,\text{ProductLog}[a\,x^2])^{5/2}}{35\,c^3\,x^6}$$

Result (type 8, 18 leaves):

$$\int \frac{1}{x^7 \sqrt{c\,\text{ProductLog}[a\,x^2]}}\,dx$$

Problem 245: Unable to integrate problem.

$$\int \frac{(c\,\text{ProductLog}[a\,x^2])^p}{x^3}\,dx$$

Optimal (type 4, 103 leaves, 5 steps):

$$-\frac{e^{2\,\text{ProductLog}[a\,x^2]}\,\text{Gamma}[-1+p,\,\text{ProductLog}[a\,x^2]]\,\text{ProductLog}[a\,x^2]^{2-p}\,(c\,\text{ProductLog}[a\,x^2])^p}{2\,a\,x^4}-\frac{e^{2\,\text{ProductLog}[a\,x^2]}\,\text{Gamma}[p,\,\text{ProductLog}[a\,x^2]]\,\text{ProductLog}[a\,x^2]^{2-p}\,(c\,\text{ProductLog}[a\,x^2])^p}{2\,a\,x^4}$$

Result (type 8, 16 leaves):

$$\int \frac{(c\,\text{ProductLog}[a\,x^2])^p}{x^3}\,dx$$

Problem 246: Unable to integrate problem.

$$\int x^4\,\text{ProductLog}\left[\frac{a}{x}\right]\,dx$$

Optimal (type 4, 75 leaves, 5 steps):

$$-\frac{125}{24} a^5 \text{ExpIntegralEi}\left[-5 \text{ProductLog}\left[\frac{a}{x}\right]\right]+\frac{1}{4} x^5 \text{ProductLog}\left[\frac{a}{x}\right]-\frac{1}{12} x^5 \text{ProductLog}\left[\frac{a}{x}\right]^2+\frac{5}{24} x^5 \text{ProductLog}\left[\frac{a}{x}\right]^3-\frac{25}{24} x^5 \text{ProductLog}\left[\frac{a}{x}\right]^4$$

Result (type 8, 12 leaves):

$$\int x^4 \text{ProductLog}\left[\frac{a}{x}\right] dx$$

Problem 247: Unable to integrate problem.

$$\int x^3 \text{ProductLog}\left[\frac{a}{x}\right] dx$$

Optimal (type 4, 60 leaves, 4 steps):

$$\frac{8}{3} a^4 \text{ExpIntegralEi}\left[-4 \text{ProductLog}\left[\frac{a}{x}\right]\right]+\frac{1}{3} x^4 \text{ProductLog}\left[\frac{a}{x}\right]-\frac{1}{6} x^4 \text{ProductLog}\left[\frac{a}{x}\right]^2+\frac{2}{3} x^4 \text{ProductLog}\left[\frac{a}{x}\right]^3$$

Result (type 8, 12 leaves):

$$\int x^3 \text{ProductLog}\left[\frac{a}{x}\right] dx$$

Problem 248: Unable to integrate problem.

$$\int x^2 \text{ProductLog}\left[\frac{a}{x}\right] dx$$

Optimal (type 4, 45 leaves, 3 steps):

$$-\frac{3}{2} a^3 \text{ExpIntegralEi}\left[-3 \text{ProductLog}\left[\frac{a}{x}\right]\right]+\frac{1}{2} x^3 \text{ProductLog}\left[\frac{a}{x}\right]-\frac{1}{2} x^3 \text{ProductLog}\left[\frac{a}{x}\right]^2$$

Result (type 8, 12 leaves):

$$\int x^2 \text{ProductLog}\left[\frac{a}{x}\right] dx$$

Problem 249: Unable to integrate problem.

$$\int x \text{ProductLog}\left[\frac{a}{x}\right] dx$$

Optimal (type 4, 24 leaves, 2 steps):

$a^2\,\text{ExpIntegralEi}\left[-2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]+x^2\,\text{ProductLog}\left[\frac{a}{x}\right]$

Result (type 8, 10 leaves):

$\int x\,\text{ProductLog}\left[\frac{a}{x}\right]\,dx$

Problem 250: Unable to integrate problem.

$\int \text{ProductLog}\left[\frac{a}{x}\right]\,dx$

Optimal (type 4, 21 leaves, 3 steps):

$-a\,\text{ExpIntegralEi}\left[-\text{ProductLog}\left[\frac{a}{x}\right]\right]+x\,\text{ProductLog}\left[\frac{a}{x}\right]$

Result (type 8, 8 leaves):

$\int \text{ProductLog}\left[\frac{a}{x}\right]\,dx$

Problem 253: Unable to integrate problem.

$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{x^3}\,dx$

Optimal (type 4, 51 leaves, 5 steps):

$\frac{1}{4\,x^2}+\frac{1}{8\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^2}-\frac{1}{4\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]}-\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{2\,x^2}$

Result (type 8, 12 leaves):

$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{x^3}\,dx$

Problem 254: Unable to integrate problem.

$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{x^4}\,dx$

Optimal (type 4, 66 leaves, 6 steps):

$$\frac{1}{9x^3}-\frac{2}{81x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^3}+\frac{2}{27x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2}-\frac{1}{9x^3\,\text{ProductLog}\left[\frac{a}{x}\right]}-\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{3x^3}$$

Result (type 8, 12 leaves):

$$\int\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{x^4}\,dx$$

Problem 255: Unable to integrate problem.

$$\int\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{x^5}\,dx$$

Optimal (type 4, 81 leaves, 7 steps):

$$\frac{1}{16x^4}+\frac{3}{512x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^4}-\frac{3}{128x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^3}+\frac{3}{64x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^2}-\frac{1}{16x^4\,\text{ProductLog}\left[\frac{a}{x}\right]}-\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{4x^4}$$

Result (type 8, 12 leaves):

$$\int\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{x^5}\,dx$$

Problem 256: Unable to integrate problem.

$$\int x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Optimal (type 4, 62 leaves, 4 steps):

$$\frac{25}{3}a^5\,\text{ExpIntegralEi}\left[-5\,\text{ProductLog}\left[\frac{a}{x}\right]\right]+\frac{1}{3}x^5\,\text{ProductLog}\left[\frac{a}{x}\right]^2-\frac{1}{3}x^5\,\text{ProductLog}\left[\frac{a}{x}\right]^3+\frac{5}{3}x^5\,\text{ProductLog}\left[\frac{a}{x}\right]^4$$

Result (type 8, 14 leaves):

$$\int x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Problem 257: Unable to integrate problem.

$$\int x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Optimal (type 4, 43 leaves, 3 steps):

$$-4\,a^4\,\text{ExpIntegralEi}\left[-4\,\text{ProductLog}\left[\frac{a}{x}\right]\right]+\frac{1}{2}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^2-x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^3$$

Result (type 8, 14 leaves):

$$\int x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Problem 258: Unable to integrate problem.

$$\int x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Optimal (type 4, 27 leaves, 2 steps):

$$2\,a^3\,\text{ExpIntegralEi}\left[-3\,\text{ProductLog}\left[\frac{a}{x}\right]\right]+x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2$$

Result (type 8, 14 leaves):

$$\int x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Problem 259: Unable to integrate problem.

$$\int x\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$-a^2\,\text{ExpIntegralEi}\left[-2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]+\frac{1}{2}\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^2$$

Result (type 8, 12 leaves):

$$\int x\,\text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Problem 260: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x}\right]^2\,dx$$

Optimal (type 4, 20 leaves, 2 steps):

$$2\,x\,\text{ProductLog}\left[\frac{a}{x}\right]+x\,\text{ProductLog}\left[\frac{a}{x}\right]^2$$

Result (type 8, 10 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x}\right]^2 dx$$

Problem 263: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{x^3}\,dx$$

Optimal (type 4, 66 leaves, 6 steps):

$$-\frac{3}{4\,x^2}-\frac{3}{8\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^2}+\frac{3}{4\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]}+\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{2\,x^2}-\frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{2\,x^2}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{x^3}\,dx$$

Problem 264: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{x^4}\,dx$$

Optimal (type 4, 81 leaves, 7 steps):

$$-\frac{8}{27\,x^3}+\frac{16}{243\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^3}-\frac{16}{81\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2}+\frac{8}{27\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]}+\frac{2\,\text{ProductLog}\left[\frac{a}{x}\right]}{9\,x^3}-\frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{3\,x^3}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{x^4}\,dx$$

Problem 265: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{x^5}\,dx$$

Optimal (type 4, 96 leaves, 8 steps):

$$-\frac{5}{32\,x^4}-\frac{15}{1024\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^4}+\frac{15}{256\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^3}-\frac{15}{128\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^2}+\frac{5}{32\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]}+\frac{\text{ProductLog}\left[\frac{a}{x}\right]}{8\,x^4}-\frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{4\,x^4}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{x^5}\,dx$$

Problem 266: Unable to integrate problem.

$$\int x^3\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 94 leaves, 5 steps):

$$-\frac{256}{105}\,a^4\,\sqrt{\pi}\,\text{Erf}\left[2\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]+\frac{2}{7}\,x^4\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}-\frac{2}{35}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}+\frac{16}{105}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^{5/2}-\frac{128}{105}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^{7/2}$$

Result (type 8, 16 leaves):

$$\int x^3\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 267: Unable to integrate problem.

$$\int x^2\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 83 leaves, 4 steps):

$$\frac{4}{5}\,a^3\,\sqrt{3\,\pi}\,\text{Erf}\left[\sqrt{3}\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]+\frac{2}{5}\,x^3\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}-\frac{2}{15}\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}+\frac{4}{5}\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^{5/2}$$

Result (type 8, 16 leaves):

$$\int x^2 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\, dx$$

Problem 268: Unable to integrate problem.

$$\int x \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\, dx$$

Optimal (type 4, 66 leaves, 3 steps):

$$-\frac{2}{3} a^2 \sqrt{2\pi}\, \text{Erf}\left[\sqrt{2} \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2}{3} x^2 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \frac{2}{3} x^2 \,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}$$

Result (type 8, 14 leaves):

$$\int x \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\, dx$$

Problem 269: Unable to integrate problem.

$$\int \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\, dx$$

Optimal (type 4, 32 leaves, 2 steps):

$$a \sqrt{\pi}\, \text{Erf}\left[\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + 2 x \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}$$

Result (type 8, 12 leaves):

$$\int \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\, dx$$

Problem 272: Unable to integrate problem.

$$\int \frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{x^3}\, dx$$

Optimal (type 4, 85 leaves, 4 steps):

$$\frac{3\sqrt{\frac{\pi}{2}}\,\text{Erfi}\left[\sqrt{2}\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]}{64\,a^2}-\frac{3}{32\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}}+\frac{1}{8\,x^2\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}-\frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{2\,x^2}$$

Result (type 8, 16 leaves) :

$$\int\frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{x^3}\,dx$$

Problem 273: Unable to integrate problem.

$$\int\frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{x^4}\,dx$$

Optimal (type 4, 102 leaves, 5 steps) :

$$-\frac{5\sqrt{\frac{\pi}{3}}\,\text{Erfi}\left[\sqrt{3}\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]}{432\,a^3}+\frac{5}{216\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^{5/2}}-\frac{5}{108\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}}+\frac{1}{18\,x^3\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}-\frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{3\,x^3}$$

Result (type 8, 16 leaves) :

$$\int\frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{x^4}\,dx$$

Problem 274: Unable to integrate problem.

$$\int\frac{x^3}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\,dx$$

Optimal (type 4, 111 leaves, 6 steps) :

$$-\frac{2048}{945} a^4 \sqrt{\pi}\, \text{Erf}\left[2 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2 x^4}{9 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} +$$

$$\frac{2}{63} x^4 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \frac{16}{315} x^4\, \text{ProductLog}\left[\frac{a}{x}\right]^{3/2} + \frac{128}{945} x^4\, \text{ProductLog}\left[\frac{a}{x}\right]^{5/2} - \frac{1024}{945} x^4\, \text{ProductLog}\left[\frac{a}{x}\right]^{7/2}$$

Result (type 8, 16 leaves) :

$$\int \frac{x^3}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Problem 275: Unable to integrate problem.

$$\int \frac{x^2}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Optimal (type 4, 100 leaves, 5 steps) :

$$\frac{24}{35} a^3 \sqrt{3 \pi}\, \text{Erf}\left[\sqrt{3} \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2 x^3}{7 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} + \frac{2}{35} x^3 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \frac{4}{35} x^3\, \text{ProductLog}\left[\frac{a}{x}\right]^{3/2} + \frac{24}{35} x^3\, \text{ProductLog}\left[\frac{a}{x}\right]^{5/2}$$

Result (type 8, 16 leaves) :

$$\int \frac{x^2}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Problem 276: Unable to integrate problem.

$$\int \frac{x}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Optimal (type 4, 83 leaves, 4 steps) :

$$-\frac{8}{15} a^2 \sqrt{2\pi}\, \text{Erf}\left[\sqrt{2}\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2 x^2}{5 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} + \frac{2}{15} x^2 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \frac{8}{15} x^2\, \text{ProductLog}\left[\frac{a}{x}\right]^{3/2}$$

Result (type 8, 14 leaves):

$$\int \frac{x}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Problem 277: Unable to integrate problem.

$$\int \frac{1}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Optimal (type 4, 52 leaves, 4 steps):

$$\frac{2}{3} a \sqrt{\pi}\, \text{Erf}\left[\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2 x}{3 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} + \frac{2}{3} x \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}$$

Result (type 8, 12 leaves):

$$\int \frac{1}{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Problem 280: Unable to integrate problem.

$$\int \frac{1}{x^3 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\, dx$$

Optimal (type 4, 68 leaves, 3 steps):

$$\frac{\sqrt{\frac{\pi}{2}}\,\text{Erfi}\left[\sqrt{2}\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]}{16\,a^2}-\frac{1}{8\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}}-\frac{1}{2\,x^2\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}$$

Result (type 8, 16 leaves):

$$\int\frac{1}{x^3\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\,dx$$

Problem 281: Unable to integrate problem.

$$\int\frac{1}{x^4\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\,dx$$

Optimal (type 4, 85 leaves, 4 steps):

$$-\frac{\sqrt{\frac{\pi}{3}}\,\text{Erfi}\left[\sqrt{3}\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]}{72\,a^3}+\frac{1}{36\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^{5/2}}-\frac{1}{18\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^{3/2}}-\frac{1}{3\,x^3\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}$$

Result (type 8, 16 leaves):

$$\int\frac{1}{x^4\,\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}\,dx$$

Problem 282: Unable to integrate problem.

$$\int x^2\left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p\,dx$$

Optimal (type 4, 122 leaves, 4 steps):

$$\frac{3^{3-p}\, e^{4\,\text{ProductLog}\left[\frac{a}{x}\right]}\, x^4\, \text{Gamma}\left[-3+p,\ 3\,\text{ProductLog}\left[\frac{a}{x}\right]\right]\, \text{ProductLog}\left[\frac{a}{x}\right]^{4-p}\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p}{a}+$$
$$\frac{3^{2-p}\, e^{4\,\text{ProductLog}\left[\frac{a}{x}\right]}\, x^4\, \text{Gamma}\left[-2+p,\ 3\,\text{ProductLog}\left[\frac{a}{x}\right]\right]\, \text{ProductLog}\left[\frac{a}{x}\right]^{3-p}\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^{1+p}}{a\,c}$$

Result (type 8, 16 leaves):

$$\int x^2\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p\, dx$$

Problem 283: Unable to integrate problem.

$$\int x\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p\, dx$$

Optimal (type 4, 122 leaves, 4 steps):

$$\frac{2^{2-p}\, e^{3\,\text{ProductLog}\left[\frac{a}{x}\right]}\, x^3\, \text{Gamma}\left[-2+p,\ 2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]\, \text{ProductLog}\left[\frac{a}{x}\right]^{3-p}\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p}{a}+$$
$$\frac{2^{1-p}\, e^{3\,\text{ProductLog}\left[\frac{a}{x}\right]}\, x^3\, \text{Gamma}\left[-1+p,\ 2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]\, \text{ProductLog}\left[\frac{a}{x}\right]^{2-p}\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^{1+p}}{a\,c}$$

Result (type 8, 14 leaves):

$$\int x\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p\, dx$$

Problem 286: Unable to integrate problem.

$$\int \frac{\left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p}{x^3}\, dx$$

Optimal (type 4, 128 leaves, 4 steps):

$$-\frac{2^{-2-p}\, e^{-\text{ProductLog}\left[\frac{a}{x}\right]}\, \text{Gamma}\left[2+p,\ -2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]\, \left(-\text{ProductLog}\left[\frac{a}{x}\right]\right)^{-1-p}\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p}{a\,x}-$$
$$\frac{2^{-3-p}\, e^{-\text{ProductLog}\left[\frac{a}{x}\right]}\, \text{Gamma}\left[3+p,\ -2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]\, \left(-\text{ProductLog}\left[\frac{a}{x}\right]\right)^{-2-p}\, \left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^{1+p}}{a\,c\,x}$$

Result (type 8, 16 leaves):

$$\int \frac{\left(c\,\text{ProductLog}\left[\frac{a}{x}\right]\right)^p}{x^3}\,dx$$

Problem 287: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5\,dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$\frac{5}{4}\,x\,\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^4 + x\,\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5$$

Result (type 8, 12 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5\,dx$$

Problem 288: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4\,dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$\frac{4}{3}\,x\,\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^3 + x\,\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4$$

Result (type 8, 12 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4\,dx$$

Problem 289: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^3\,dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$\frac{3}{2}\,x\,\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^2 + x\,\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^3$$

Result (type 8, 12 leaves):

$$\int \text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^3 dx$$

Problem 290: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x}\right]^2 dx$$

Optimal (type 4, 20 leaves, 2 steps):

$$2\, x\, \text{ProductLog}\left[\frac{a}{x}\right] + x\, \text{ProductLog}\left[\frac{a}{x}\right]^2$$

Result (type 8, 10 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x}\right]^2 dx$$

Problem 294: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x^{1/5}}\right]^4 dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$20\, a^5\, \text{ExpIntegralEi}\left[-5\, \text{ProductLog}\left[\frac{a}{x^{1/5}}\right]\right] + 5\, x\, \text{ProductLog}\left[\frac{a}{x^{1/5}}\right]^4$$

Result (type 8, 12 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x^{1/5}}\right]^4 dx$$

Problem 295: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^3 dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$12\, a^4\, \text{ExpIntegralEi}\left[-4\, \text{ProductLog}\left[\frac{a}{x^{1/4}}\right]\right] + 4\, x\, \text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^3$$

Result (type 8, 12 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^3 dx$$

Problem 296: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^2 dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$6\, a^3\, \text{ExpIntegralEi}\left[-3\, \text{ProductLog}\left[\frac{a}{x^{1/3}}\right]\right] + 3\, x\, \text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^2$$

Result (type 8, 12 leaves):

$$\int \text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^2 dx$$

Problem 297: Unable to integrate problem.

$$\int \text{ProductLog}\left[\frac{a}{\sqrt{x}}\right] dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$2\, a^2\, \text{ExpIntegralEi}\left[-2\, \text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]\right] + 2\, x\, \text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]$$

Result (type 8, 10 leaves):

$$\int \text{ProductLog}\left[\frac{a}{\sqrt{x}}\right] dx$$

Problem 302: Unable to integrate problem.

$$\int \text{ProductLog}\left[a\, x^n\right]^{\frac{-1+n}{n}} dx$$

Optimal (type 4, 39 leaves, 2 steps):

$$(1-n)\, x\, \text{ProductLog}\left[a\, x^n\right]^{-1/n} + x\, \text{ProductLog}\left[a\, x^n\right]^{-\frac{1-n}{n}}$$

Result (type 8, 16 leaves):

$$\int \text{ProductLog}\left[a\, x^n\right]^{\frac{-1+n}{n}} dx$$

Problem 303: Unable to integrate problem.

$$\int \text{ProductLog}\left[a\, x^{\frac{1}{1-p}}\right]^p \, dx$$

Optimal (type 4, 44 leaves, 2 steps):

$$-\frac{p\, x\, \text{ProductLog}\left[a\, x^{\frac{1}{1-p}}\right]^{-1+p}}{1-p} + x\, \text{ProductLog}\left[a\, x^{\frac{1}{1-p}}\right]^p$$

Result (type 8, 16 leaves):

$$\int \text{ProductLog}\left[a\, x^{\frac{1}{1-p}}\right]^p \, dx$$

Problem 304: Unable to integrate problem.

$$\int x^{-1-n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{9/2} \, dx$$

Optimal (type 4, 139 leaves, 5 steps):

$$\frac{135\, a\, c^{9/2} \sqrt{\pi}\, \text{Erf}\left[\frac{\sqrt{c\, \text{ProductLog}[a\, x^n]}}{\sqrt{c}}\right]}{16\, n} - \frac{135\, c^3\, x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{3/2}}{8\, n} - \frac{45\, c^2\, x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{5/2}}{4\, n} - \frac{9\, c\, x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{7/2}}{2\, n} - \frac{x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{9/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{9/2} \, dx$$

Problem 305: Unable to integrate problem.

$$\int x^{-1-n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{7/2} \, dx$$

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

$$\frac{21\, a\, c^{7/2} \sqrt{\pi}\, \text{Erf}\left[\frac{\sqrt{c\, \text{ProductLog}[a\, x^n]}}{\sqrt{c}}\right]}{8\, n} - \frac{21\, c^2\, x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{3/2}}{4\, n} - \frac{7\, c\, x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{5/2}}{2\, n} - \frac{x^{-n} \left(c\, \text{ProductLog}[a\, x^n]\right)^{7/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{7/2} \, dx$$

Problem 306: Unable to integrate problem.

$$\int x^{-1-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{5/2} \, dx$$

Optimal (type 4, 85 leaves, 3 steps):

$$\frac{5 \,a \,c^{5/2} \sqrt{\pi} \,\text{Erf}\left[\frac{\sqrt{c \,\text{ProductLog}\left[a \,x^n\right]}}{\sqrt{c}}\right]}{4 \,n} - \frac{5 \,c \,x^{-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{3/2}}{2 \,n} - \frac{x^{-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{5/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{5/2} \, dx$$

Problem 307: Unable to integrate problem.

$$\int x^{-1-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{3/2} \, dx$$

Optimal (type 4, 60 leaves, 2 steps):

$$\frac{3 \,a \,c^{3/2} \sqrt{\pi} \,\text{Erf}\left[\frac{\sqrt{c \,\text{ProductLog}\left[a \,x^n\right]}}{\sqrt{c}}\right]}{2 \,n} - \frac{x^{-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{3/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} \left(c \,\text{ProductLog}\left[a \,x^n\right]\right)^{3/2} \, dx$$

Problem 308: Unable to integrate problem.

$$\int x^{-1-n} \sqrt{c \,\text{ProductLog}\left[a \,x^n\right]} \, dx$$

Optimal (type 4, 58 leaves, 2 steps):

$$-\frac{a \sqrt{c} \sqrt{\pi} \,\text{Erf}\left[\frac{\sqrt{c \,\text{ProductLog}\left[a \,x^n\right]}}{\sqrt{c}}\right]}{n} - \frac{2 \,x^{-n} \sqrt{c \,\text{ProductLog}\left[a \,x^n\right]}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n}\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}\,dx$$

Problem 309: Unable to integrate problem.

$$\int \frac{x^{-1-n}}{\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}\,dx$$

Optimal (type 4, 89 leaves, 3 steps):

$$-\frac{2\,a\,\sqrt{\pi}\,\text{Erf}\left[\frac{\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}{\sqrt{c}}\right]}{3\,\sqrt{c}\,n}-\frac{2\,x^{-n}}{3\,n\,\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}-\frac{2\,x^{-n}\,\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}{3\,c\,n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-n}}{\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}\,dx$$

Problem 310: Unable to integrate problem.

$$\int \frac{x^{-1-n}}{\left(c\,\text{ProductLog}\left[a\,x^{n}\right]\right)^{3/2}}\,dx$$

Optimal (type 4, 116 leaves, 4 steps):

$$\frac{4\,a\,\sqrt{\pi}\,\text{Erf}\left[\frac{\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}{\sqrt{c}}\right]}{5\,c^{3/2}\,n}-\frac{2\,x^{-n}}{5\,n\,\left(c\,\text{ProductLog}\left[a\,x^{n}\right]\right)^{3/2}}-\frac{2\,x^{-n}}{5\,c\,n\,\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}+\frac{4\,x^{-n}\,\sqrt{c\,\text{ProductLog}\left[a\,x^{n}\right]}}{5\,c^{2}\,n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-n}}{\left(c\,\text{ProductLog}\left[a\,x^{n}\right]\right)^{3/2}}\,dx$$

Problem 311: Unable to integrate problem.

$$\int \frac{x^{-1-n}}{\left(c\,\text{ProductLog}\left[a\,x^{n}\right]\right)^{5/2}}\,dx$$

Optimal (type 4, 143 leaves, 5 steps):

$$-\frac{8 a \sqrt{\pi}\, \text{Erf}\left[\frac{\sqrt{c\, \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{21 c^{5/2} n} - \frac{2 x^{-n}}{7 n \left(c\, \text{ProductLog}[a x^n]\right)^{5/2}} - \frac{2 x^{-n}}{7 c n \left(c\, \text{ProductLog}[a x^n]\right)^{3/2}} + \frac{4 x^{-n}}{21 c^2 n \sqrt{c\, \text{ProductLog}[a x^n]}} - \frac{8 x^{-n} \sqrt{c\, \text{ProductLog}[a x^n]}}{21 c^3 n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-n}}{\left(c\, \text{ProductLog}[a x^n]\right)^{5/2}}\, dx$$

Problem 312: Unable to integrate problem.

$$\int x^{-1-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{11/2} dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$\frac{165 a^2 c^{11/2} \sqrt{\frac{\pi}{2}}\, \text{Erf}\left[\frac{\sqrt{2} \sqrt{c\, \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{256 n} - \frac{165 c^3 x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{5/2}}{128 n} - \frac{55 c^2 x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{7/2}}{32 n} - \frac{11 c\, x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{9/2}}{8 n} - \frac{x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{11/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{11/2} dx$$

Problem 313: Unable to integrate problem.

$$\int x^{-1-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{9/2} dx$$

Optimal (type 4, 125 leaves, 4 steps):

$$\frac{27 a^2 c^{9/2} \sqrt{\frac{\pi}{2}}\, \text{Erf}\left[\frac{\sqrt{2} \sqrt{c\, \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{64 n} - \frac{27 c^2 x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{5/2}}{32 n} - \frac{9 c\, x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{7/2}}{8 n} - \frac{x^{-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{9/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \left(c\, \text{ProductLog}[a x^n]\right)^{9/2} dx$$

Problem 314: Unable to integrate problem.

$$\int x^{-1-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{7/2} \, dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$\frac{7 a^2 c^{7/2} \sqrt{\frac{\pi}{2}}\, \text{Erf}\left[\frac{\sqrt{2} \sqrt{c\, \text{ProductLog}\left[a\, x^n\right]}}{\sqrt{c}}\right]}{16 n} - \frac{7 c\, x^{-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{5/2}}{8 n} - \frac{x^{-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{7/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{7/2} \, dx$$

Problem 315: Unable to integrate problem.

$$\int x^{-1-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{5/2} \, dx$$

Optimal (type 4, 73 leaves, 2 steps):

$$\frac{5 a^2 c^{5/2} \sqrt{\frac{\pi}{2}}\, \text{Erf}\left[\frac{\sqrt{2} \sqrt{c\, \text{ProductLog}\left[a\, x^n\right]}}{\sqrt{c}}\right]}{4 n} - \frac{x^{-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{5/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{5/2} \, dx$$

Problem 316: Unable to integrate problem.

$$\int x^{-1-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{3/2} \, dx$$

Optimal (type 4, 69 leaves, 2 steps):

$$-\frac{3 a^2 c^{3/2} \sqrt{\frac{\pi}{2}}\, \text{Erf}\left[\frac{\sqrt{2} \sqrt{c\, \text{ProductLog}\left[a\, x^n\right]}}{\sqrt{c}}\right]}{n} - \frac{2 x^{-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{3/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \left(c\, \text{ProductLog}\left[a\, x^n\right]\right)^{3/2} \, dx$$

Problem 317: Unable to integrate problem.

$$\int x^{-1-2n} \sqrt{c\,\text{ProductLog}[a\,x^n]}\,dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$\frac{2\,a^2\,\sqrt{c}\,\sqrt{2\,\pi}\,\text{Erf}\left[\frac{\sqrt{2}\,\sqrt{c\,\text{ProductLog}[a\,x^n]}}{\sqrt{c}}\right]}{3\,n}-\frac{2\,x^{-2\,n}\,\sqrt{c\,\text{ProductLog}[a\,x^n]}}{3\,n}+\frac{2\,x^{-2\,n}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{3/2}}{3\,c\,n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \sqrt{c\,\text{ProductLog}[a\,x^n]}\,dx$$

Problem 318: Unable to integrate problem.

$$\int \frac{x^{-1-2n}}{\sqrt{c\,\text{ProductLog}[a\,x^n]}}\,dx$$

Optimal (type 4, 125 leaves, 4 steps):

$$\frac{8\,a^2\,\sqrt{2\,\pi}\,\text{Erf}\left[\frac{\sqrt{2}\,\sqrt{c\,\text{ProductLog}[a\,x^n]}}{\sqrt{c}}\right]}{15\,\sqrt{c}\,n}-\frac{2\,x^{-2\,n}}{5\,n\,\sqrt{c\,\text{ProductLog}[a\,x^n]}}-\frac{2\,x^{-2\,n}\,\sqrt{c\,\text{ProductLog}[a\,x^n]}}{15\,c\,n}+\frac{8\,x^{-2\,n}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{3/2}}{15\,c^2\,n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-2n}}{\sqrt{c\,\text{ProductLog}[a\,x^n]}}\,dx$$

Problem 319: Unable to integrate problem.

$$\int \frac{x^{-1-2n}}{\left(c\,\text{ProductLog}[a\,x^n]\right)^{3/2}}\,dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$-\frac{32 a^2 \sqrt{2\pi}\, \text{Erf}\left[\frac{\sqrt{2}\sqrt{c\, \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{35 c^{3/2} n}-\frac{2 x^{-2n}}{7 n \left(c\, \text{ProductLog}[a x^n]\right)^{3/2}}-\frac{6 x^{-2n}}{35 c n \sqrt{c\, \text{ProductLog}[a x^n]}}+\frac{8 x^{-2n}\sqrt{c\, \text{ProductLog}[a x^n]}}{35 c^2 n}-\frac{32 x^{-2n}\left(c\, \text{ProductLog}[a x^n]\right)^{3/2}}{35 c^3 n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-2n}}{\left(c\, \text{ProductLog}[a x^n]\right)^{3/2}}\, dx$$

Problem 328: Unable to integrate problem.

$$\int x^{-1+2n}\left(c\, \text{ProductLog}[a x^n]\right)^{3/2} dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$\frac{45 c^{3/2}\sqrt{\frac{\pi}{2}}\, \text{Erfi}\left[\frac{\sqrt{2}\sqrt{c\, \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{256 a^2 n}-\frac{45 c^3 x^{2n}}{128 n \left(c\, \text{ProductLog}[a x^n]\right)^{3/2}}+\frac{15 c^2 x^{2n}}{32 n \sqrt{c\, \text{ProductLog}[a x^n]}}-\frac{3 c x^{2n}\sqrt{c\, \text{ProductLog}[a x^n]}}{8 n}+\frac{x^{2n}\left(c\, \text{ProductLog}[a x^n]\right)^{3/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1+2n}\left(c\, \text{ProductLog}[a x^n]\right)^{3/2} dx$$

Problem 329: Unable to integrate problem.

$$\int x^{-1+2n}\sqrt{c\, \text{ProductLog}[a x^n]}\, dx$$

Optimal (type 4, 125 leaves, 4 steps):

$$-\frac{3\sqrt{c}\sqrt{\frac{\pi}{2}}\, \text{Erfi}\left[\frac{\sqrt{2}\sqrt{c\, \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{64 a^2 n}+\frac{3 c^2 x^{2n}}{32 n \left(c\, \text{ProductLog}[a x^n]\right)^{3/2}}-\frac{c x^{2n}}{8 n \sqrt{c\, \text{ProductLog}[a x^n]}}+\frac{x^{2n}\sqrt{c\, \text{ProductLog}[a x^n]}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1+2n} \sqrt{c \,\text{ProductLog}[a x^n]} \, dx$$

Problem 330: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{\sqrt{c \,\text{ProductLog}[a x^n]}} \, dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$-\frac{\sqrt{\frac{\pi}{2}} \,\text{Erfi}\left[\frac{\sqrt{2} \sqrt{c \,\text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{16 a^2 \sqrt{c} \, n} + \frac{c x^{2n}}{8 n (c \,\text{ProductLog}[a x^n])^{3/2}} + \frac{x^{2n}}{2 n \sqrt{c \,\text{ProductLog}[a x^n]}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{\sqrt{c \,\text{ProductLog}[a x^n]}} \, dx$$

Problem 331: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{(c \,\text{ProductLog}[a x^n])^{3/2}} \, dx$$

Optimal (type 4, 73 leaves, 2 steps):

$$\frac{3 \sqrt{\frac{\pi}{2}} \,\text{Erfi}\left[\frac{\sqrt{2} \sqrt{c \,\text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{4 a^2 c^{3/2} n} + \frac{x^{2n}}{2 n (c \,\text{ProductLog}[a x^n])^{3/2}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{(c \,\text{ProductLog}[a x^n])^{3/2}} \, dx$$

Problem 332: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{(c \,\text{ProductLog}[a x^n])^{5/2}} \, dx$$

Optimal (type 4, 69 leaves, 2 steps):

$$\frac{5\sqrt{\frac{\pi}{2}}\,\text{Erfi}\left[\frac{\sqrt{2}\sqrt{c\,\text{ProductLog}[a\,x^n]}}{\sqrt{c}}\right]}{a^2\,c^{5/2}\,n}-\frac{2\,x^{2\,n}}{n\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{5/2}}$$

Result (type 8, 22 leaves):

$$\int\frac{x^{-1+2\,n}}{\left(c\,\text{ProductLog}[a\,x^n]\right)^{5/2}}\,dx$$

Problem 333: Unable to integrate problem.

$$\int\frac{x^{-1+2\,n}}{\left(c\,\text{ProductLog}[a\,x^n]\right)^{7/2}}\,dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$\frac{14\sqrt{2\,\pi}\,\text{Erfi}\left[\frac{\sqrt{2}\sqrt{c\,\text{ProductLog}[a\,x^n]}}{\sqrt{c}}\right]}{3\,a^2\,c^{7/2}\,n}-\frac{2\,x^{2\,n}}{3\,n\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{7/2}}-\frac{14\,x^{2\,n}}{3\,c\,n\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{5/2}}$$

Result (type 8, 22 leaves):

$$\int\frac{x^{-1+2\,n}}{\left(c\,\text{ProductLog}[a\,x^n]\right)^{7/2}}\,dx$$

Problem 334: Unable to integrate problem.

$$\int\frac{x^{-1+2\,n}}{\left(c\,\text{ProductLog}[a\,x^n]\right)^{9/2}}\,dx$$

Optimal (type 4, 125 leaves, 4 steps):

$$\frac{24\sqrt{2\,\pi}\,\text{Erfi}\left[\frac{\sqrt{2}\sqrt{c\,\text{ProductLog}[a\,x^n]}}{\sqrt{c}}\right]}{5\,a^2\,c^{9/2}\,n}-\frac{2\,x^{2\,n}}{5\,n\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{9/2}}-\frac{6\,x^{2\,n}}{5\,c\,n\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{7/2}}-\frac{24\,x^{2\,n}}{5\,c^2\,n\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{5/2}}$$

Result (type 8, 22 leaves):

$$\int\frac{x^{-1+2\,n}}{\left(c\,\text{ProductLog}[a\,x^n]\right)^{9/2}}\,dx$$

Problem 335: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{(c\,\text{ProductLog}[a\,x^n])^{11/2}}\,dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$\frac{352\sqrt{2\pi}\,\text{Erfi}\left[\frac{\sqrt{2}\sqrt{c\,\text{ProductLog}[a\,x^n]}}{\sqrt{c}}\right]}{105\,a^2\,c^{11/2}\,n}-\frac{2\,x^{2n}}{7\,n\,(c\,\text{ProductLog}[a\,x^n])^{11/2}}-\frac{22\,x^{2n}}{35\,c\,n\,(c\,\text{ProductLog}[a\,x^n])^{9/2}}-\frac{88\,x^{2n}}{105\,c^2\,n\,(c\,\text{ProductLog}[a\,x^n])^{7/2}}-\frac{352\,x^{2n}}{105\,c^3\,n\,(c\,\text{ProductLog}[a\,x^n])^{5/2}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{(c\,\text{ProductLog}[a\,x^n])^{11/2}}\,dx$$

Problem 336: Unable to integrate problem.

$$\int x^{-1-3n}\,\text{ProductLog}[a\,x^n]^4\,dx$$

Optimal (type 4, 41 leaves, 2 steps):

$$-\frac{4\,x^{-3n}\,\text{ProductLog}[a\,x^n]^3}{9\,n}-\frac{x^{-3n}\,\text{ProductLog}[a\,x^n]^4}{3\,n}$$

Result (type 8, 18 leaves):

$$\int x^{-1-3n}\,\text{ProductLog}[a\,x^n]^4\,dx$$

Problem 337: Unable to integrate problem.

$$\int x^{-1-2n}\,\text{ProductLog}[a\,x^n]^3\,dx$$

Optimal (type 4, 41 leaves, 2 steps):

$$-\frac{3\,x^{-2n}\,\text{ProductLog}[a\,x^n]^2}{4\,n}-\frac{x^{-2n}\,\text{ProductLog}[a\,x^n]^3}{2\,n}$$

Result (type 8, 18 leaves):

$$\int x^{-1-2n}\,\text{ProductLog}[a\,x^n]^3\,dx$$

Problem 338: Unable to integrate problem.

$$\int x^{-1-n}\,\text{ProductLog}[a\,x^n]^2\,dx$$

Optimal (type 4, 35 leaves, 2 steps):

$$-\frac{2\,x^{-n}\,\text{ProductLog}[a\,x^n]}{n}-\frac{x^{-n}\,\text{ProductLog}[a\,x^n]^2}{n}$$

Result (type 8, 18 leaves):

$$\int x^{-1-n}\,\text{ProductLog}[a\,x^n]^2\,dx$$

Problem 339: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{\text{ProductLog}[a\,x^n]}\,dx$$

Optimal (type 4, 41 leaves, 2 steps):

$$\frac{x^{2n}}{4\,n\,\text{ProductLog}[a\,x^n]^2}+\frac{x^{2n}}{2\,n\,\text{ProductLog}[a\,x^n]}$$

Result (type 8, 18 leaves):

$$\int \frac{x^{-1+2n}}{\text{ProductLog}[a\,x^n]}\,dx$$

Problem 340: Unable to integrate problem.

$$\int \frac{x^{-1+3n}}{\text{ProductLog}[a\,x^n]^2}\,dx$$

Optimal (type 4, 41 leaves, 2 steps):

$$\frac{2\,x^{3n}}{9\,n\,\text{ProductLog}[a\,x^n]^3}+\frac{x^{3n}}{3\,n\,\text{ProductLog}[a\,x^n]^2}$$

Result (type 8, 18 leaves):

$$\int \frac{x^{-1+3n}}{\text{ProductLog}[a\,x^n]^2}\,dx$$

Problem 341: Unable to integrate problem.

$$\int \frac{x^{-1+4n}}{\text{ProductLog}[a\,x^n]^3}\,dx$$

Optimal (type 4, 41 leaves, 2 steps):

$$\frac{3\,x^{4n}}{16\,n\,\text{ProductLog}[a\,x^n]^4}+\frac{x^{4n}}{4\,n\,\text{ProductLog}[a\,x^n]^3}$$

Result (type 8, 18 leaves):

$$\int \frac{x^{-1+4n}}{\text{ProductLog}[a\,x^n]^3}\,dx$$

Problem 344: Unable to integrate problem.

$$\int x^{-1+n\,(1-p)}\,\left(c\,\text{ProductLog}\left[a\,x^n\right]\right)^p\,dx$$

Optimal (type 4, 66 leaves, 2 steps):

$$-\frac{c\,p\,x^{n\,(1-p)}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{-1+p}}{n\,\left(1-p\right)^2}+\frac{x^{n\,(1-p)}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^p}{n\,\left(1-p\right)}$$

Result (type 8, 24 leaves):

$$\int x^{-1+n\,(1-p)}\,\left(c\,\text{ProductLog}\left[a\,x^n\right]\right)^p\,dx$$

Problem 345: Unable to integrate problem.

$$\int x^{-1+n\,(2-p)}\,\left(c\,\text{ProductLog}\left[a\,x^n\right]\right)^p\,dx$$

Optimal (type 4, 102 leaves, 3 steps):

$$\frac{c^2\,p\,x^{n\,(2-p)}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{-2+p}}{n\,\left(2-p\right)^3}-\frac{c\,p\,x^{n\,(2-p)}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^{-1+p}}{n\,\left(2-p\right)^2}+\frac{x^{n\,(2-p)}\,\left(c\,\text{ProductLog}[a\,x^n]\right)^p}{n\,\left(2-p\right)}$$

Result (type 8, 24 leaves):

$$\int x^{-1+n\,(2-p)}\,\left(c\,\text{ProductLog}\left[a\,x^n\right]\right)^p\,dx$$

Problem 346: Unable to integrate problem.

$$\int x^{-1+n\,(3-p)}\,\left(c\,\text{ProductLog}\left[a\,x^n\right]\right)^p\,dx$$

Optimal (type 4, 140 leaves, 4 steps):

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

Result (type 8, 24 leaves):

$$\int x^{-1+n\,(3-p)}\,\left(c\,\text{ProductLog}\left[a\,x^n\right]\right)^p\,dx$$

Problem 361: Unable to integrate problem.

$$\int \frac{1}{x^3\,\left(1+\text{ProductLog}\left[a\,x^2\right]\right)}\,dx$$

Optimal (type 4, 22 leaves, 3 steps):

$$-\frac{1}{2\,x^2}-\frac{1}{2}\,a\,\text{ExpIntegralEi}\left[-\text{ProductLog}\left[a\,x^2\right]\right]$$

Result (type 8, 16 leaves):

$$\int \frac{1}{x^3\,\left(1+\text{ProductLog}\left[a\,x^2\right]\right)}\,dx$$

Problem 363: Unable to integrate problem.

$$\int \frac{x^3}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 67 leaves, 6 steps):

$$\frac{x^4}{4}-\frac{32}{3}\,a^4\,\text{ExpIntegralEi}\left[-4\,\text{ProductLog}\left[\frac{a}{x}\right]\right]-\frac{1}{3}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]+\frac{2}{3}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^2-\frac{8}{3}\,x^4\,\text{ProductLog}\left[\frac{a}{x}\right]^3$$

Result (type 8, 16 leaves):

$$\int \frac{x^3}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 364: Unable to integrate problem.

$$\int \frac{x^2}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 52 leaves, 5 steps):

$$\frac{x^3}{3}+\frac{9}{2}\,a^3\,\text{ExpIntegralEi}\left[-3\,\text{ProductLog}\left[\frac{a}{x}\right]\right]-\frac{1}{2}\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]+\frac{3}{2}\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2$$

Result (type 8, 16 leaves):

$$\int \frac{x^2}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 365: Unable to integrate problem.

$$\int \frac{x}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 33 leaves, 4 steps):

$$\frac{x^2}{2}-2\,a^2\,\text{ExpIntegralEi}\left[-2\,\text{ProductLog}\left[\frac{a}{x}\right]\right]-x^2\,\text{ProductLog}\left[\frac{a}{x}\right]$$

Result (type 8, 14 leaves):

$$\int \frac{x}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 366: Unable to integrate problem.

$$\int \frac{1}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 13 leaves, 3 steps):

$$x+a\,\text{ExpIntegralEi}\left[-\text{ProductLog}\left[\frac{a}{x}\right]\right]$$

Result (type 8, 12 leaves):

$$\int \frac{1}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 369: Unable to integrate problem.

$$\int \frac{1}{x^3\left(1+\text{ProductLog}\left[\frac{a}{x}\right]\right)}\,dx$$

Optimal (type 4, 31 leaves, 3 steps):

$$\frac{1}{4\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]^2}-\frac{1}{2\,x^2\,\text{ProductLog}\left[\frac{a}{x}\right]}$$

Result (type 8, 16 leaves):

$$\int \frac{1}{x^3\left(1+\text{ProductLog}\left[\frac{a}{x}\right]\right)}\,dx$$

Problem 370: Unable to integrate problem.

$$\int \frac{1}{x^4\left(1+\text{ProductLog}\left[\frac{a}{x}\right]\right)}\,dx$$

Optimal (type 4, 46 leaves, 4 steps):

$$-\frac{2}{27\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^3}+\frac{2}{9\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]^2}-\frac{1}{3\,x^3\,\text{ProductLog}\left[\frac{a}{x}\right]}$$

Result (type 8, 16 leaves):

$$\int \frac{1}{x^4 \left(1 + \text{ProductLog}\left[\frac{a}{x}\right]\right)} \, dx$$

Problem 371: Unable to integrate problem.

$$\int \frac{x^5}{1 + \text{ProductLog}\left[\frac{a}{x^2}\right]} \, dx$$

Optimal (type 4, 52 leaves, 6 steps):

$$\frac{x^6}{6} + \frac{9}{4} a^3 \text{ExpIntegralEi}\left[-3 \text{ProductLog}\left[\frac{a}{x^2}\right]\right] - \frac{1}{4} x^6 \text{ProductLog}\left[\frac{a}{x^2}\right] + \frac{3}{4} x^6 \text{ProductLog}\left[\frac{a}{x^2}\right]^2$$

Result (type 8, 16 leaves):

$$\int \frac{x^5}{1 + \text{ProductLog}\left[\frac{a}{x^2}\right]} \, dx$$

Problem 372: Unable to integrate problem.

$$\int \frac{x^3}{1 + \text{ProductLog}\left[\frac{a}{x^2}\right]} \, dx$$

Optimal (type 4, 35 leaves, 5 steps):

$$\frac{x^4}{4} - a^2 \text{ExpIntegralEi}\left[-2 \text{ProductLog}\left[\frac{a}{x^2}\right]\right] - \frac{1}{2} x^4 \text{ProductLog}\left[\frac{a}{x^2}\right]$$

Result (type 8, 16 leaves):

$$\int \frac{x^3}{1 + \text{ProductLog}\left[\frac{a}{x^2}\right]} \, dx$$

Problem 373: Unable to integrate problem.

$$\int \frac{x}{1 + \text{ProductLog}\left[\frac{a}{x^2}\right]} \, dx$$

Optimal (type 4, 22 leaves, 4 steps):

$$\frac{x^2}{2}+\frac{1}{2}\,a\,\text{ExpIntegralEi}\left[-\text{ProductLog}\left[\frac{a}{x^2}\right]\right]$$

Result (type 8, 14 leaves):

$$\int \frac{x}{1+\text{ProductLog}\left[\frac{a}{x^2}\right]}\,dx$$

Problem 382: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5}{1+\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]}\,dx$$

Optimal (type 4, 12 leaves, 1 step):

$$x\,\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^4$$

Result (type 8, 25 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5}{1+\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]}\,dx$$

Problem 383: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4}{1+\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]}\,dx$$

Optimal (type 4, 12 leaves, 1 step):

$$x\,\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^3$$

Result (type 8, 25 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4}{1+\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]}\,dx$$

Problem 384: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^3}{1+\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]}\,dx$$

Optimal (type 4, 12 leaves, 1 step):

$$x\,\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^2$$

Result (type 8, 25 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^3}{1+\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]}\,dx$$

Problem 385: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 8 leaves, 1 step):

$$x\,\text{ProductLog}\left[\frac{a}{x}\right]$$

Result (type 8, 21 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 389: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^4}{1+\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]}\,dx$$

Optimal (type 4, 16 leaves, 1 step):

$$-4\,a^4\,\text{ExpIntegralEi}\left[-4\,\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]\right]$$

Result (type 8, 25 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]^4}{1+\text{ProductLog}\left[\frac{a}{x^{1/4}}\right]}\,dx$$

Problem 390: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^3}{1+\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]}\,dx$$

Optimal (type 4, 16 leaves, 1 step):

$$-3\,a^3\,\text{ExpIntegralEi}\left[-3\,\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]\right]$$

Result (type 8, 25 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]^3}{1+\text{ProductLog}\left[\frac{a}{x^{1/3}}\right]}\,dx$$

Problem 391: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^2}{1+\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]}\,dx$$

Optimal (type 4, 16 leaves, 1 step):

$$-2\,a^2\,\text{ExpIntegralEi}\left[-2\,\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]\right]$$

Result (type 8, 25 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]^2}{1+\text{ProductLog}\left[\frac{a}{\sqrt{x}}\right]}\,dx$$

Problem 392: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Optimal (type 4, 12 leaves, 1 step):

$$-a\,\text{ExpIntegralEi}\left[-\text{ProductLog}\left[\frac{a}{x}\right]\right]$$

Result (type 8, 19 leaves):

$$\int \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{1+\text{ProductLog}\left[\frac{a}{x}\right]}\,dx$$

Problem 397: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a\,x^n\right]^{1-\frac{1}{n}}}{1+\text{ProductLog}\left[a\,x^n\right]}\,dx$$

Optimal (type 4, 14 leaves, 1 step):

$$x\,\text{ProductLog}\left[a\,x^n\right]^{-1/n}$$

Result (type 8, 27 leaves):

$$\int \frac{\text{ProductLog}\left[a\,x^n\right]^{1-\frac{1}{n}}}{1+\text{ProductLog}\left[a\,x^n\right]}\,dx$$

Problem 398: Unable to integrate problem.

$$\int \frac{\text{ProductLog}\left[a\,x^{\frac{1}{1-p}}\right]^p}{1+\text{ProductLog}\left[a\,x^{\frac{1}{1-p}}\right]}\,dx$$

Optimal (type 4, 18 leaves, 1 step):

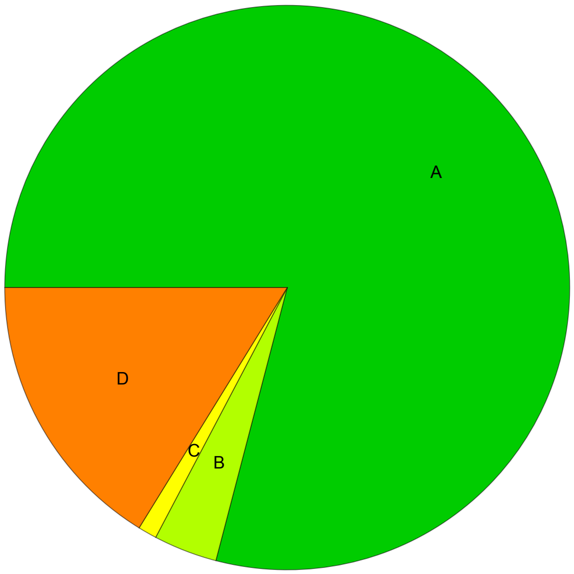
$$x\,\text{ProductLog}\left[a\,x^{\frac{1}{1-p}}\right]^{-1+p}$$

Result (type 8, 33 leaves):

$$\int \frac{\text{ProductLog}\left[a\, x^{\frac{1}{1-p}}\right]^{p}}{1+\text{ProductLog}\left[a\, x^{\frac{1}{1-p}}\right]}\, dx$$

Summary of Integration Test Results

1949 integration problems



A - 1541 optimal antiderivatives

B - 71 more than twice size of optimal antiderivatives

C - 21 unnecessarily complex antiderivatives

D - 316 unable to integrate problems

E - 0 integration timeouts