

Mathematica 11.3 Integration Test Results

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):

$$\int \frac{\text{ProductLog}[a x^2]}{x^5} dx$$

Problem 163: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]}{x^7} dx$$

Optimal (type 4, 45 leaves, 3 steps):

$$\frac{3}{4} a^3 \text{ExpIntegralEi}[-3 \text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]}{4 x^6} + \frac{\text{ProductLog}[a x^2]^2}{4 x^6}$$

Result (type 8, 12 leaves):

$$\int \frac{\text{ProductLog}[a x^2]}{x^7} dx$$

Problem 170: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^3} dx$$

Optimal (type 4, 27 leaves, 2 steps):

$$-\frac{\text{ProductLog}[a x^2]}{x^2} - \frac{\text{ProductLog}[a x^2]^2}{2 x^2}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^3} dx$$

Problem 172: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^5} dx$$

Optimal (type 4, 32 leaves, 2 steps):

$$\frac{1}{2} a^2 \text{ExpIntegralEi}[-2 \text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]^2}{4 x^4}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^5} dx$$

Problem 174: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^7} dx$$

Optimal (type 4, 30 leaves, 2 steps):

$$-a^3 \text{ExpIntegralEi}[-3 \text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]^2}{2 x^6}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^7} dx$$

Problem 176: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^9} dx$$

Optimal (type 4, 45 leaves, 3 steps):

$$2 a^4 \text{ExpIntegralEi}[-4 \text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]^2}{4 x^8} + \frac{\text{ProductLog}[a x^2]^3}{2 x^8}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}[a x^2]^2}{x^9} dx$$

Problem 182: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^2]^3}{x^3} dx$$

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.

$$\int \frac{\text{ProductLog}[a x^2]^3}{x^9} dx$$

Optimal (type 4, 32 leaves, 2 steps):

$$-\frac{3}{2} a^4 \text{ExpIntegralEi}[-4 \text{ProductLog}[a x^2]] - \frac{\text{ProductLog}[a x^2]^3}{2 x^8}$$

Result (type 8, 14 leaves):

$$\int \frac{\text{ProductLog}[a x^2]^3}{x^9} dx$$

Problem 197: Unable to integrate problem.

$$\int \frac{1}{x^3 \text{ProductLog}[a x^2]} dx$$

Optimal (type 4, 37 leaves, 4 steps):

$$-\frac{1}{4 x^2} - \frac{1}{4} a \text{ExpIntegralEi}[-\text{ProductLog}[a x^2]] - \frac{1}{4 x^2 \text{ProductLog}[a x^2]}$$

Result (type 8, 14 leaves):

$$\int \frac{1}{x^3 \text{ProductLog}[a x^2]} dx$$

Problem 199: Unable to integrate problem.

$$\int \frac{1}{x^5 \text{ProductLog}[a x^2]} dx$$

Optimal (type 4, 52 leaves, 5 steps):

$$-\frac{1}{12 x^4} + \frac{1}{3} a^2 \text{ExpIntegralEi}[-2 \text{ProductLog}[a x^2]] - \frac{1}{6 x^4 \text{ProductLog}[a x^2]} + \frac{\text{ProductLog}[a x^2]}{6 x^4}$$

Result (type 8, 14 leaves):

$$\int \frac{1}{x^5 \text{ProductLog}[a x^2]} dx$$

Problem 210: Unable to integrate problem.

$$\int \frac{1}{x^3 \text{ProductLog}[a x^2]^2} dx$$

Optimal (type 4, 52 leaves, 5 steps):

$$\frac{1}{6 x^2} + \frac{1}{6} a \text{ExpIntegralEi}[-\text{ProductLog}[a x^2]] - \frac{1}{6 x^2 \text{ProductLog}[a x^2]^2} - \frac{1}{6 x^2 \text{ProductLog}[a x^2]}$$

Result (type 8, 14 leaves):

$$\int \frac{1}{x^3 \text{ProductLog}[a x^2]^2} dx$$

Problem 212: Unable to integrate problem.

$$\int x^6 \sqrt{c \text{ProductLog}[a x^2]} dx$$

Optimal (type 4, 106 leaves, 5 steps):

$$\frac{48 c^4 x^7}{16807 (c \text{ProductLog}[a x^2])^{7/2}} - \frac{24 c^3 x^7}{2401 (c \text{ProductLog}[a x^2])^{5/2}} + \frac{6 c^2 x^7}{343 (c \text{ProductLog}[a x^2])^{3/2}} - \frac{c x^7}{49 \sqrt{c \text{ProductLog}[a x^2]}} + \frac{1}{7} x^7 \sqrt{c \text{ProductLog}[a x^2]}$$

Result (type 8, 18 leaves):

$$\int x^6 \sqrt{c \text{ProductLog}[a x^2]} dx$$

Problem 214: Unable to integrate problem.

$$\int x^4 \sqrt{c \text{ProductLog}[a x^2]} dx$$

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

$$-\frac{8 c^3 x^5}{625 (c \text{ProductLog}[a x^2])^{5/2}} + \frac{4 c^2 x^5}{125 (c \text{ProductLog}[a x^2])^{3/2}} - \frac{c x^5}{25 \sqrt{c \text{ProductLog}[a x^2]}} + \frac{1}{5} x^5 \sqrt{c \text{ProductLog}[a x^2]}$$

Result (type 8, 18 leaves):

$$\int x^4 \sqrt{c \operatorname{ProductLog}[a x^2]} dx$$

Problem 216: Unable to integrate problem.

$$\int x^2 \sqrt{c \operatorname{ProductLog}[a x^2]} dx$$

Optimal (type 4, 62 leaves, 3 steps):

$$\frac{2 c^2 x^3}{27 (c \operatorname{ProductLog}[a x^2])^{3/2}} - \frac{c x^3}{9 \sqrt{c \operatorname{ProductLog}[a x^2]}} + \frac{1}{3} x^3 \sqrt{c \operatorname{ProductLog}[a x^2]}$$

Result (type 8, 18 leaves):

$$\int x^2 \sqrt{c \operatorname{ProductLog}[a x^2]} dx$$

Problem 218: Unable to integrate problem.

$$\int \sqrt{c \operatorname{ProductLog}[a x^2]} dx$$

Optimal (type 4, 31 leaves, 2 steps):

$$-\frac{c x}{\sqrt{c \operatorname{ProductLog}[a x^2]}} + x \sqrt{c \operatorname{ProductLog}[a x^2]}$$

Result (type 8, 14 leaves):

$$\int \sqrt{c \operatorname{ProductLog}[a x^2]} dx$$

Problem 221: Unable to integrate problem.

$$\int \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^3} dx$$

Optimal (type 4, 52 leaves, 2 steps):

$$-\frac{1}{2} a \sqrt{c} \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{\sqrt{c}}\right] - \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^2}$$

Result (type 8, 18 leaves):

$$\int \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^3} dx$$

Problem 223: Unable to integrate problem.

$$\int \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^5} dx$$

Optimal (type 4, 85 leaves, 3 steps):

$$\frac{1}{3} a^2 \sqrt{c} \sqrt{2\pi} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^2]}}{\sqrt{c}}\right] - \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{3 x^4} + \frac{(c \operatorname{ProductLog}[a x^2])^{3/2}}{3 c x^4}$$

Result (type 8, 18 leaves):

$$\int \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^5} dx$$

Problem 225: Unable to integrate problem.

$$\int \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^7} dx$$

Optimal (type 4, 107 leaves, 4 steps):

$$-\frac{2}{5} a^3 \sqrt{c} \sqrt{3\pi} \operatorname{Erf}\left[\frac{\sqrt{3} \sqrt{c \operatorname{ProductLog}[a x^2]}}{\sqrt{c}}\right] - \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{5 x^6} + \frac{(c \operatorname{ProductLog}[a x^2])^{3/2}}{15 c x^6} - \frac{2 (c \operatorname{ProductLog}[a x^2])^{5/2}}{5 c^2 x^6}$$

Result (type 8, 18 leaves):

$$\int \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{x^7} dx$$

Problem 227: Unable to integrate problem.

$$\int \frac{x^6}{\sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

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

$$\frac{8 c^3 x^7}{2401 (c \operatorname{ProductLog}[a x^2])^{7/2}} - \frac{4 c^2 x^7}{343 (c \operatorname{ProductLog}[a x^2])^{5/2}} + \frac{c x^7}{49 (c \operatorname{ProductLog}[a x^2])^{3/2}} + \frac{x^7}{7 \sqrt{c \operatorname{ProductLog}[a x^2]}}$$

Result (type 8, 18 leaves):

$$\int \frac{x^6}{\sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Problem 229: Unable to integrate problem.

$$\int \frac{x^4}{\sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Optimal (type 4, 62 leaves, 3 steps):

$$-\frac{2 c^2 x^5}{125 (c \operatorname{ProductLog}[a x^2])^{5/2}} + \frac{c x^5}{25 (c \operatorname{ProductLog}[a x^2])^{3/2}} + \frac{x^5}{5 \sqrt{c \operatorname{ProductLog}[a x^2]}}$$

Result (type 8, 18 leaves):

$$\int \frac{x^4}{\sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Problem 231: Unable to integrate problem.

$$\int \frac{x^2}{\sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Optimal (type 4, 40 leaves, 2 steps):

$$\frac{c x^3}{9 (c \operatorname{ProductLog}[a x^2])^{3/2}} + \frac{x^3}{3 \sqrt{c \operatorname{ProductLog}[a x^2]}}$$

Result (type 8, 18 leaves):

$$\int \frac{x^2}{\sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Problem 236: Unable to integrate problem.

$$\int \frac{1}{x^3 \sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Optimal (type 4, 76 leaves, 3 steps):

$$-\frac{a \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{\sqrt{c}}\right]}{3 \sqrt{c}} - \frac{1}{3 x^2 \sqrt{c \operatorname{ProductLog}[a x^2]}} - \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{3 c x^2}$$

Result (type 8, 18 leaves):

$$\int \frac{1}{x^3 \sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Problem 238: Unable to integrate problem.

$$\int \frac{1}{x^5 \sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Optimal (type 4, 107 leaves, 4 steps):

$$\frac{4 a^2 \sqrt{2 \pi} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^2]}}{\sqrt{c}}\right]}{15 \sqrt{c}} - \frac{1}{5 x^4 \sqrt{c \operatorname{ProductLog}[a x^2]}} - \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{15 c x^4} + \frac{4 (c \operatorname{ProductLog}[a x^2])^{3/2}}{15 c^2 x^4}$$

Result (type 8, 18 leaves):

$$\int \frac{1}{x^5 \sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Problem 240: Unable to integrate problem.

$$\int \frac{1}{x^7 \sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Optimal (type 4, 129 leaves, 5 steps):

$$-\frac{12 a^3 \sqrt{3 \pi} \operatorname{Erf}\left[\frac{\sqrt{3} \sqrt{c \operatorname{ProductLog}[a x^2]}}{\sqrt{c}}\right]}{35 \sqrt{c}} - \frac{1}{7 x^6 \sqrt{c \operatorname{ProductLog}[a x^2]}} - \frac{\sqrt{c \operatorname{ProductLog}[a x^2]}}{35 c x^6} + \frac{2 (c \operatorname{ProductLog}[a x^2])^{3/2}}{35 c^2 x^6} - \frac{12 (c \operatorname{ProductLog}[a x^2])^{5/2}}{35 c^3 x^6}$$

Result (type 8, 18 leaves):

$$\int \frac{1}{x^7 \sqrt{c \operatorname{ProductLog}[a x^2]}} dx$$

Problem 245: Unable to integrate problem.

$$\int \frac{(c \operatorname{ProductLog}[a x^2])^p}{x^3} dx$$

Optimal (type 4, 103 leaves, 5 steps):

$$-\frac{1}{2 a x^4} e^{2 \text{ProductLog}[a x^2]} \text{Gamma}[-1+p, \text{ProductLog}[a x^2]] \text{ProductLog}[a x^2]^{2-p} (c \text{ProductLog}[a x^2])^p -$$

$$\frac{1}{2 a x^4} e^{2 \text{ProductLog}[a x^2]} \text{Gamma}[p, \text{ProductLog}[a x^2]] \text{ProductLog}[a x^2]^{2-p} (c \text{ProductLog}[a x^2])^p$$

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):

$$\frac{1}{4x^2} + \frac{1}{8x^2 \text{ProductLog}\left[\frac{a}{x}\right]^2} - \frac{1}{4x^2 \text{ProductLog}\left[\frac{a}{x}\right]} - \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{2x^2}$$

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):

$$\frac{1}{9 x^3} - \frac{2}{81 x^3 \text{ProductLog}\left[\frac{a}{x}\right]^3} + \frac{2}{27 x^3 \text{ProductLog}\left[\frac{a}{x}\right]^2} - \frac{1}{9 x^3 \text{ProductLog}\left[\frac{a}{x}\right]} - \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{3 x^3}$$

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):

$$\frac{1}{16 x^4} + \frac{3}{512 x^4 \text{ProductLog}\left[\frac{a}{x}\right]^4} - \frac{3}{128 x^4 \text{ProductLog}\left[\frac{a}{x}\right]^3} + \frac{3}{64 x^4 \text{ProductLog}\left[\frac{a}{x}\right]^2} - \frac{1}{16 x^4 \text{ProductLog}\left[\frac{a}{x}\right]} - \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{4 x^4}$$

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):

$$-\frac{3}{4x^2} - \frac{3}{8x^2 \text{ProductLog}\left[\frac{a}{x}\right]^2} + \frac{3}{4x^2 \text{ProductLog}\left[\frac{a}{x}\right]} + \frac{\text{ProductLog}\left[\frac{a}{x}\right]}{2x^2} - \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{2x^2}$$

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):

$$-\frac{8}{27x^3} + \frac{16}{243x^3 \text{ProductLog}\left[\frac{a}{x}\right]^3} - \frac{16}{81x^3 \text{ProductLog}\left[\frac{a}{x}\right]^2} + \frac{8}{27x^3 \text{ProductLog}\left[\frac{a}{x}\right]} + \frac{2 \text{ProductLog}\left[\frac{a}{x}\right]}{9x^3} - \frac{\text{ProductLog}\left[\frac{a}{x}\right]^2}{3x^3}$$

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):

$$\begin{aligned} & -\frac{5\sqrt{\frac{\pi}{3}} \text{Erfi}\left[\sqrt{3}\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right]}{432a^3} + \frac{5}{216x^3 \text{ProductLog}\left[\frac{a}{x}\right]^{5/2}} - \\ & \frac{5}{108x^3 \text{ProductLog}\left[\frac{a}{x}\right]^{3/2}} + \frac{1}{18x^3 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} - \frac{\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}}{3x^3} \end{aligned}$$

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):

$$\begin{aligned} & -\frac{2048}{945} a^4 \sqrt{\pi} \text{Erf}\left[2\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2x^4}{9\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} + \frac{2}{63} x^4 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \\ & \frac{16}{315} x^4 \text{ProductLog}\left[\frac{a}{x}\right]^{3/2} + \frac{128}{945} x^4 \text{ProductLog}\left[\frac{a}{x}\right]^{5/2} - \frac{1024}{945} x^4 \text{ProductLog}\left[\frac{a}{x}\right]^{7/2} \end{aligned}$$

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):

$$\frac{24}{35} a^3 \sqrt{3\pi} \text{Erf}\left[\sqrt{3} \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2x^3}{7\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} +$$

$$\frac{2}{35} x^3 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \frac{4}{35} x^3 \text{ProductLog}\left[\frac{a}{x}\right]^{3/2} + \frac{24}{35} x^3 \text{ProductLog}\left[\frac{a}{x}\right]^{5/2}$$

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):

$$-\frac{8}{15} a^2 \sqrt{2\pi} \text{Erf}\left[\sqrt{2} \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] +$$

$$\frac{2x^2}{5\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} + \frac{2}{15} x^2 \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]} - \frac{8}{15} x^2 \text{ProductLog}\left[\frac{a}{x}\right]^{3/2}$$

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):

$$\frac{2}{3} a \sqrt{\pi} \text{Erf}\left[\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}\right] + \frac{2x}{3\sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}} + \frac{2}{3} x \sqrt{\text{ProductLog}\left[\frac{a}{x}\right]}$$

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):

$$-\frac{\sqrt{\frac{\pi}{3}} \operatorname{Erfi}\left[\sqrt{3} \sqrt{\operatorname{ProductLog}\left[\frac{a}{x}\right]}\right]}{72 a^3} + \frac{1}{36 x^3 \operatorname{ProductLog}\left[\frac{a}{x}\right]^{5/2}} - \frac{1}{18 x^3 \operatorname{ProductLog}\left[\frac{a}{x}\right]^{3/2}} - \frac{1}{3 x^3 \sqrt{\operatorname{ProductLog}\left[\frac{a}{x}\right]}}$$

Result (type 8, 16 leaves):

$$\int \frac{1}{x^4 \sqrt{\operatorname{ProductLog}\left[\frac{a}{x}\right]}} dx$$

Problem 282: Unable to integrate problem.

$$\int x^2 \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^p dx$$

Optimal (type 4, 122 leaves, 4 steps):

$$\frac{1}{a} 3^{3-p} e^{4 \operatorname{ProductLog}\left[\frac{a}{x}\right]} x^4 \operatorname{Gamma}\left[-3+p, 3 \operatorname{ProductLog}\left[\frac{a}{x}\right]\right] \operatorname{ProductLog}\left[\frac{a}{x}\right]^{4-p} \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^p + \frac{1}{a c} 3^{2-p} e^{4 \operatorname{ProductLog}\left[\frac{a}{x}\right]} x^4 \operatorname{Gamma}\left[-2+p, 3 \operatorname{ProductLog}\left[\frac{a}{x}\right]\right] \operatorname{ProductLog}\left[\frac{a}{x}\right]^{3-p} \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^{1+p}$$

Result (type 8, 16 leaves):

$$\int x^2 \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^p dx$$

Problem 283: Unable to integrate problem.

$$\int x \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^p dx$$

Optimal (type 4, 122 leaves, 4 steps):

$$\frac{1}{a} 2^{2-p} e^{3 \operatorname{ProductLog}\left[\frac{a}{x}\right]} x^3 \operatorname{Gamma}\left[-2+p, 2 \operatorname{ProductLog}\left[\frac{a}{x}\right]\right] \operatorname{ProductLog}\left[\frac{a}{x}\right]^{3-p} \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^p + \frac{1}{a c} 2^{1-p} e^{3 \operatorname{ProductLog}\left[\frac{a}{x}\right]} x^3 \operatorname{Gamma}\left[-1+p, 2 \operatorname{ProductLog}\left[\frac{a}{x}\right]\right] \operatorname{ProductLog}\left[\frac{a}{x}\right]^{2-p} \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^{1+p}$$

Result (type 8, 14 leaves):

$$\int x \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right] \right)^p dx$$

Problem 286: Unable to integrate problem.

$$\int \frac{\left(c \operatorname{ProductLog}\left[\frac{a}{x}\right]\right)^p}{x^3} dx$$

Optimal (type 4, 128 leaves, 4 steps):

$$-\frac{1}{a x} 2^{-2-p} e^{-\operatorname{ProductLog}\left[\frac{a}{x}\right]} \operatorname{Gamma}\left[2+p, -2 \operatorname{ProductLog}\left[\frac{a}{x}\right]\right] \\ \left(-\operatorname{ProductLog}\left[\frac{a}{x}\right]\right)^{-1-p} \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right]\right)^p - \frac{1}{a c x} \\ 2^{-3-p} e^{-\operatorname{ProductLog}\left[\frac{a}{x}\right]} \operatorname{Gamma}\left[3+p, -2 \operatorname{ProductLog}\left[\frac{a}{x}\right]\right] \left(-\operatorname{ProductLog}\left[\frac{a}{x}\right]\right)^{-2-p} \left(c \operatorname{ProductLog}\left[\frac{a}{x}\right]\right)^{1+p}$$

Result (type 8, 16 leaves):

$$\int \frac{\left(c \operatorname{ProductLog}\left[\frac{a}{x}\right]\right)^p}{x^3} dx$$

Problem 287: Unable to integrate problem.

$$\int \operatorname{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5 dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$\frac{5}{4} x \operatorname{ProductLog}\left[\frac{a}{x^{1/4}}\right]^4 + x \operatorname{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5$$

Result (type 8, 12 leaves):

$$\int \operatorname{ProductLog}\left[\frac{a}{x^{1/4}}\right]^5 dx$$

Problem 288: Unable to integrate problem.

$$\int \operatorname{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4 dx$$

Optimal (type 4, 28 leaves, 2 steps):

$$\frac{4}{3} x \operatorname{ProductLog}\left[\frac{a}{x^{1/3}}\right]^3 + x \operatorname{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4$$

Result (type 8, 12 leaves):

$$\int \operatorname{ProductLog}\left[\frac{a}{x^{1/3}}\right]^4 dx$$

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):

$$\frac{135 a c^{9/2} \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \text{ProductLog}\left[a x^n\right]}}{\sqrt{c}}\right]}{16 n} - \frac{135 c^3 x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{3/2}}{8 n} - \frac{45 c^2 x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{5/2}}{4 n} - \frac{9 c x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{7/2}}{2 n} - \frac{x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{9/2}}{n}$$

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):

$$\frac{21 a c^{7/2} \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \text{ProductLog}\left[a x^n\right]}}{\sqrt{c}}\right]}{8 n} - \frac{21 c^2 x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{3/2}}{4 n} - \frac{7 c x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{5/2}}{2 n} - \frac{x^{-n} \left(c \text{ProductLog}\left[a x^n\right]\right)^{7/2}}{n}$$

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):

$$\frac{5 a c^{5/2} \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{4 n} - \frac{5 c x^{-n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{2 n} - \frac{x^{-n} (c \operatorname{ProductLog}[a x^n])^{5/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} (c \operatorname{ProductLog}[a x^n])^{5/2} dx$$

Problem 307: Unable to integrate problem.

$$\int x^{-1-n} (c \operatorname{ProductLog}[a x^n])^{3/2} dx$$

Optimal (type 4, 60 leaves, 2 steps):

$$\frac{3 a c^{3/2} \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{2 n} - \frac{x^{-n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} (c \operatorname{ProductLog}[a x^n])^{3/2} dx$$

Problem 308: Unable to integrate problem.

$$\int x^{-1-n} \sqrt{c \operatorname{ProductLog}[a x^n]} dx$$

Optimal (type 4, 58 leaves, 2 steps):

$$\frac{a \sqrt{c} \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{n} - \frac{2 x^{-n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-n} \sqrt{c \operatorname{ProductLog}[a x^n]} dx$$

Problem 309: Unable to integrate problem.

$$\int \frac{x^{-1-n}}{\sqrt{c \operatorname{ProductLog}[a x^n]}} dx$$

Optimal (type 4, 89 leaves, 3 steps):

$$\frac{2 a \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{3 \sqrt{c} n} - \frac{2 x^{-n}}{3 n \sqrt{c \operatorname{ProductLog}[a x^n]}} - \frac{2 x^{-n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{3 c n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-n}}{\sqrt{c \operatorname{ProductLog}[a x^n]}} dx$$

Problem 310: Unable to integrate problem.

$$\int \frac{x^{-1-n}}{(c \operatorname{ProductLog}[a x^n])^{3/2}} dx$$

Optimal (type 4, 116 leaves, 4 steps):

$$\frac{4 a \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{5 c^{3/2} n} - \frac{2 x^{-n}}{5 n (c \operatorname{ProductLog}[a x^n])^{3/2}} - \frac{2 x^{-n}}{5 c n \sqrt{c \operatorname{ProductLog}[a x^n]}} + \frac{4 x^{-n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{5 c^2 n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-n}}{(c \operatorname{ProductLog}[a x^n])^{3/2}} dx$$

Problem 311: Unable to integrate problem.

$$\int \frac{x^{-1-n}}{(c \operatorname{ProductLog}[a x^n])^{5/2}} dx$$

Optimal (type 4, 143 leaves, 5 steps):

$$-\frac{8 a \sqrt{\pi} \operatorname{Erf}\left[\frac{\sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{21 c^{5/2} n} - \frac{2 x^{-n}}{7 n (c \operatorname{ProductLog}[a x^n])^{5/2}} - \frac{2 x^{-n}}{7 c n (c \operatorname{ProductLog}[a x^n])^{3/2}} + \frac{4 x^{-n}}{21 c^2 n \sqrt{c \operatorname{ProductLog}[a x^n]}} - \frac{8 x^{-n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{21 c^3 n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-n}}{(c \operatorname{ProductLog}[a x^n])^{5/2}} dx$$

Problem 312: Unable to integrate problem.

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{11/2} dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$\frac{165 a^2 c^{11/2} \sqrt{\frac{\pi}{2}} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{256 n} - \frac{165 c^3 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{5/2}}{128 n} - \frac{55 c^2 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{7/2}}{32 n} - \frac{11 c x^{-2n} (c \operatorname{ProductLog}[a x^n])^{9/2}}{8 n} - \frac{x^{-2n} (c \operatorname{ProductLog}[a x^n])^{11/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{11/2} dx$$

Problem 313: Unable to integrate problem.

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{9/2} dx$$

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

$$\frac{27 a^2 c^{9/2} \sqrt{\frac{\pi}{2}} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{64 n} - \frac{27 c^2 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{5/2}}{32 n} - \frac{9 c x^{-2n} (c \operatorname{ProductLog}[a x^n])^{7/2}}{8 n} - \frac{x^{-2n} (c \operatorname{ProductLog}[a x^n])^{9/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{9/2} dx$$

Problem 314: Unable to integrate problem.

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{7/2} dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$\frac{7 a^2 c^{7/2} \sqrt{\frac{\pi}{2}} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{16 n} - \frac{7 c x^{-2n} (c \operatorname{ProductLog}[a x^n])^{5/2}}{8 n} - \frac{x^{-2n} (c \operatorname{ProductLog}[a x^n])^{7/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{7/2} dx$$

Problem 315: Unable to integrate problem.

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{5/2} dx$$

Optimal (type 4, 73 leaves, 2 steps):

$$\frac{5 a^2 c^{5/2} \sqrt{\frac{\pi}{2}} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{4 n} - \frac{x^{-2n} (c \operatorname{ProductLog}[a x^n])^{5/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{5/2} dx$$

Problem 316: Unable to integrate problem.

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{3/2} dx$$

Optimal (type 4, 69 leaves, 2 steps):

$$-\frac{3 a^2 c^{3/2} \sqrt{\frac{\pi}{2}} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{n} - \frac{2 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} (c \operatorname{ProductLog}[a x^n])^{3/2} dx$$

Problem 317: Unable to integrate problem.

$$\int x^{-1-2n} \sqrt{c \operatorname{ProductLog}[a x^n]} dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$\frac{2 a^2 \sqrt{c} \sqrt{2 \pi} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{3 n} - \frac{2 x^{-2n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{3 n} + \frac{2 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{3 c n}$$

Result (type 8, 22 leaves):

$$\int x^{-1-2n} \sqrt{c \operatorname{ProductLog}[a x^n]} dx$$

Problem 318: Unable to integrate problem.

$$\int \frac{x^{-1-2n}}{\sqrt{c \operatorname{ProductLog}[a x^n]}} dx$$

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

$$\frac{8 a^2 \sqrt{2 \pi} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{15 \sqrt{c} n} - \frac{2 x^{-2n}}{5 n \sqrt{c \operatorname{ProductLog}[a x^n]}} - \frac{2 x^{-2n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{15 c n} + \frac{8 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{15 c^2 n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-2n}}{\sqrt{c \operatorname{ProductLog}[a x^n]}} dx$$

Problem 319: Unable to integrate problem.

$$\int \frac{x^{-1-2n}}{(c \operatorname{ProductLog}[a x^n])^{3/2}} dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$-\frac{32 a^2 \sqrt{2 \pi} \operatorname{Erf}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{35 c^{3/2} n} - \frac{2 x^{-2n}}{7 n (c \operatorname{ProductLog}[a x^n])^{3/2}} - \frac{6 x^{-2n}}{35 c n \sqrt{c \operatorname{ProductLog}[a x^n]}} + \frac{8 x^{-2n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{35 c^2 n} - \frac{32 x^{-2n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{35 c^3 n}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1-2n}}{(c \operatorname{ProductLog}[a x^n])^{3/2}} dx$$

Problem 328: Unable to integrate problem.

$$\int x^{-1+2n} (c \operatorname{ProductLog}[a x^n])^{3/2} dx$$

Optimal (type 4, 152 leaves, 5 steps):

$$\frac{45 c^{3/2} \sqrt{\frac{\pi}{2}} \operatorname{Erfi}\left[\frac{\sqrt{2} \sqrt{c \operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{256 a^2 n} - \frac{45 c^3 x^{2n}}{128 n (c \operatorname{ProductLog}[a x^n])^{3/2}} + \frac{15 c^2 x^{2n}}{32 n \sqrt{c \operatorname{ProductLog}[a x^n]}} - \frac{3 c x^{2n} \sqrt{c \operatorname{ProductLog}[a x^n]}}{8 n} + \frac{x^{2n} (c \operatorname{ProductLog}[a x^n])^{3/2}}{2 n}$$

Result (type 8, 22 leaves):

$$\int x^{-1+2n} (c \operatorname{ProductLog}[a x^n])^{3/2} dx$$

Problem 329: Unable to integrate problem.

$$\int x^{-1+2n} \sqrt{c \operatorname{ProductLog}[a x^n]} dx$$

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

$$-\frac{3\sqrt{c}\sqrt{\frac{\pi}{2}}\operatorname{Erfi}\left[\frac{\sqrt{2}\sqrt{c\operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{64a^2n} + \frac{3c^2x^{2n}}{32n(c\operatorname{ProductLog}[a x^n])^{3/2}} - \frac{cx^{2n}}{8n\sqrt{c\operatorname{ProductLog}[a x^n]}} + \frac{x^{2n}\sqrt{c\operatorname{ProductLog}[a x^n]}}{2n}$$

Result (type 8, 22 leaves):

$$\int x^{-1+2n} \sqrt{c \operatorname{ProductLog}[a x^n]} dx$$

Problem 330: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{\sqrt{c \operatorname{ProductLog}[a x^n]}} dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$-\frac{\sqrt{\frac{\pi}{2}}\operatorname{Erfi}\left[\frac{\sqrt{2}\sqrt{c\operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{16a^2\sqrt{c}n} + \frac{cx^{2n}}{8n(c\operatorname{ProductLog}[a x^n])^{3/2}} + \frac{x^{2n}}{2n\sqrt{c\operatorname{ProductLog}[a x^n]}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{\sqrt{c \operatorname{ProductLog}[a x^n]}} dx$$

Problem 331: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{(c \operatorname{ProductLog}[a x^n])^{3/2}} dx$$

Optimal (type 4, 73 leaves, 2 steps):

$$\frac{3\sqrt{\frac{\pi}{2}}\operatorname{Erfi}\left[\frac{\sqrt{2}\sqrt{c\operatorname{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{4a^2c^{3/2}n} + \frac{x^{2n}}{2n(c\operatorname{ProductLog}[a x^n])^{3/2}}$$

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):

$$\frac{5 \sqrt{\frac{\pi}{2}} \operatorname{Erfi}\left[\frac{\sqrt{2} \sqrt{c \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{a^2 c^{5/2} n} - \frac{2 x^{2n}}{n (c \text{ProductLog}[a x^n])^{5/2}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{(c \text{ProductLog}[a x^n])^{5/2}} dx$$

Problem 333: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{(c \text{ProductLog}[a x^n])^{7/2}} dx$$

Optimal (type 4, 98 leaves, 3 steps):

$$\frac{14 \sqrt{2 \pi} \operatorname{Erfi}\left[\frac{\sqrt{2} \sqrt{c \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{3 a^2 c^{7/2} n} - \frac{2 x^{2n}}{3 n (c \text{ProductLog}[a x^n])^{7/2}} - \frac{14 x^{2n}}{3 c n (c \text{ProductLog}[a x^n])^{5/2}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{(c \text{ProductLog}[a x^n])^{7/2}} dx$$

Problem 334: Unable to integrate problem.

$$\int \frac{x^{-1+2n}}{(c \text{ProductLog}[a x^n])^{9/2}} dx$$

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

$$\frac{24 \sqrt{2 \pi} \operatorname{Erfi}\left[\frac{\sqrt{2} \sqrt{c \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{5 a^2 c^{9/2} n} - \frac{2 x^{2n}}{5 n (c \text{ProductLog}[a x^n])^{9/2}} - \frac{6 x^{2n}}{5 c n (c \text{ProductLog}[a x^n])^{7/2}} - \frac{24 x^{2n}}{5 c^2 n (c \text{ProductLog}[a x^n])^{5/2}}$$

Result (type 8, 22 leaves):

$$\int \frac{x^{-1+2n}}{(c \text{ProductLog}[a x^n])^{9/2}} dx$$

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):

$$\frac{352 \sqrt{2} \pi \operatorname{Erfi}\left[\frac{\sqrt{2} \sqrt{c \text{ProductLog}[a x^n]}}{\sqrt{c}}\right]}{105 a^2 c^{11/2} n} - \frac{22 x^{2n}}{7 n (c \text{ProductLog}[a x^n])^{11/2}} - \frac{35 c n (c \text{ProductLog}[a x^n])^{9/2}}{88 x^{2n}} - \frac{105 c^2 n (c \text{ProductLog}[a x^n])^{7/2}}{105 c^3 n (c \text{ProductLog}[a x^n])^{5/2}}$$

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):

$$\frac{x^{2n}}{4n \text{ProductLog}[a x^n]^2} + \frac{x^{2n}}{2n \text{ProductLog}[a x^n]}$$

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):

$$\frac{2 x^{3n}}{9n \text{ProductLog}[a x^n]^3} + \frac{x^{3n}}{3n \text{ProductLog}[a x^n]^2}$$

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.

$$\int x^{-1+n(1-p)} (c \text{ProductLog}[a x^n])^p dx$$

Optimal (type 4, 66 leaves, 2 steps):

$$-\frac{c p x^{n(1-p)} (c \text{ProductLog}[a x^n])^{-1+p}}{n(1-p)^2} + \frac{x^{n(1-p)} (c \text{ProductLog}[a x^n])^p}{n(1-p)}$$

Result (type 8, 24 leaves):

$$\int x^{-1+n(1-p)} (c \text{ProductLog}[a x^n])^p dx$$

Problem 345: Unable to integrate problem.

$$\int x^{-1+n(2-p)} (c \text{ProductLog}[a x^n])^p dx$$

Optimal (type 4, 102 leaves, 3 steps):

$$\frac{c^2 p x^{n(2-p)} (c \text{ProductLog}[a x^n])^{-2+p}}{n(2-p)^3} - \frac{c p x^{n(2-p)} (c \text{ProductLog}[a x^n])^{-1+p}}{n(2-p)^2} + \frac{x^{n(2-p)} (c \text{ProductLog}[a x^n])^p}{n(2-p)}$$

Result (type 8, 24 leaves):

$$\int x^{-1+n(2-p)} (c \text{ProductLog}[a x^n])^p dx$$

Problem 346: Unable to integrate problem.

$$\int x^{-1+n(3-p)} (c \text{ProductLog}[a x^n])^p dx$$

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

$$-\frac{2 c^3 p x^{n(3-p)} (c \text{ProductLog}[a x^n])^{-3+p}}{n(3-p)^4} + \frac{2 c^2 p x^{n(3-p)} (c \text{ProductLog}[a x^n])^{-2+p}}{n(3-p)^3} - \frac{c p x^{n(3-p)} (c \text{ProductLog}[a x^n])^{-1+p}}{n(3-p)^2} + \frac{x^{n(3-p)} (c \text{ProductLog}[a x^n])^p}{n(3-p)}$$

Result (type 8, 24 leaves):

$$\int x^{-1+n(3-p)} (c \text{ProductLog}[a x^n])^p dx$$

Problem 361: Unable to integrate problem.

$$\int \frac{1}{x^3 (1 + \text{ProductLog}[a x^2])} dx$$

Optimal (type 4, 22 leaves, 3 steps):

$$-\frac{1}{2x^2} - \frac{1}{2} a \text{ExpIntegralEi}[-\text{ProductLog}[a x^2]]$$

Result (type 8, 16 leaves):

$$\int \frac{1}{x^3 (1 + \text{ProductLog}[a x^2])} dx$$

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.

$$\int \frac{\text{ProductLog}[a x^n]^{1-\frac{1}{n}}}{1 + \text{ProductLog}[a x^n]} dx$$

Optimal (type 4, 14 leaves, 1 step):

$$x \text{ProductLog}[a x^n]^{-1/n}$$

Result (type 8, 27 leaves):

$$\int \frac{\text{ProductLog}[a x^n]^{1-\frac{1}{n}}}{1 + \text{ProductLog}[a x^n]} dx$$

Problem 398: Unable to integrate problem.

$$\int \frac{\text{ProductLog}[a x^{\frac{1}{1-p}}]^p}{1 + \text{ProductLog}[a x^{\frac{1}{1-p}}]} dx$$

Optimal (type 4, 18 leaves, 1 step):

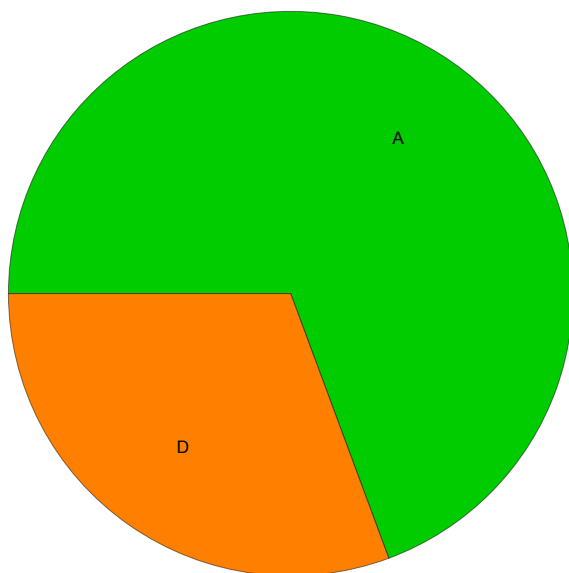
$$x \text{ProductLog}[a x^{\frac{1}{1-p}}]^{-1+p}$$

Result (type 8, 33 leaves):

$$\int \frac{\text{ProductLog}[a x^{\frac{1}{1-p}}]^p}{1 + \text{ProductLog}[a x^{\frac{1}{1-p}}]} dx$$

Summary of Integration Test Results

398 integration problems



A - 276 optimal antiderivatives

B - 0 more than twice size of optimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 122 unable to integrate problems

E - 0 integration timeouts