Mathematica 11.3 Integration Test Results

Test results for the 314 problems in "3.5 Logarithm functions.m"

Problem 39: Attempted integration timed out after 120 seconds.

$$\int \frac{n\,q - \text{Log}\left[c\,x^n\right]}{\left(a\,x + b\,\text{Log}\left[c\,x^n\right]^q\right)^2}\,dx$$

Optimal (type 8, 61 leaves, 1 step):

$$\frac{\text{Log}\left[c\,x^n\right]}{a\,\left(a\,x + b\,\text{Log}\left[c\,x^n\right]^q\right)} - \frac{n\,\left(1-q\right)\,\text{Int}\left[\frac{1}{x\,\left(a\,x+b\,\text{Log}\left[c\,x^n\right]^q\right)},\,x\right]}{a}$$

Result (type 1, 1 leaves):

???

Problem 40: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[\frac{2\,x\,\left(d\,\sqrt{-\frac{e}{d}}+e\,x\right)}{d+e\,x^2}\right]}{d + e\,x^2}\,dx$$

Optimal (type 4, 49 leaves, 1 step):

$$-\frac{\sqrt{-\frac{e}{d}}\;\text{PolyLog}\left[2,\,1-\frac{2\,x\,\left(d\,\sqrt{-\frac{e}{d}}+e\,x\right)}{d+e\,x^2}\right]}{2\,e}$$

Result (type 4, 686 leaves):

$$\frac{1}{4\sqrt{d}\sqrt{e}}\left(-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}[x]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]+\right.$$

$$i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]-i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2-$$

$$4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[-\frac{1}{\sqrt{-\frac{e}{d}}}+x\right]-2\,i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+$$

$$2\,i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+2\,i\,\text{Log}[x]\,\text{Log}\left[1-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-$$

$$2\,i\,\text{Log}[x]\,\text{Log}\left[1+\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+2\,i\,\text{Log}\left[-\frac{1}{\sqrt{-\frac{e}{d}}}+x\right]\text{Log}\left[\frac{\sqrt{d}\sqrt{e}-i\,e\,x}{\sqrt{d}\sqrt{e}+i\,d\sqrt{-\frac{e}{d}}}\right]-$$

$$2\,i\,\text{Log}\left[-\frac{1}{\sqrt{-\frac{e}{d}}}+x\right]\text{Log}\left[\frac{\sqrt{d}\sqrt{e}+i\,e\,x}{\sqrt{d}\sqrt{e}-i\,d\sqrt{-\frac{e}{d}}}\right]+$$

$$4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{2\,x\left(d\sqrt{-\frac{e}{d}}+e\,x\right)}{d+e\,x^2}\right]-2\,i\,\text{PolyLog}\left[2,-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+$$

$$2\,i\,\text{PolyLog}\left[2,\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+2\,i\,\text{PolyLog}\left[2,\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]-2\,i\,\text{PolyLog}\left[2,\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+$$

$$\left.2\,i\,\text{PolyLog}\left[2,\frac{d\sqrt{-\frac{e}{d}}+e\,x}{-i\sqrt{d}\sqrt{e}+d\sqrt{-\frac{e}{d}}}\right]-2\,i\,\text{PolyLog}\left[2,\frac{d\sqrt{-\frac{e}{d}}+e\,x}{i\sqrt{d}\sqrt{e}+d\sqrt{-\frac{e}{d}}}\right]\right)$$

Problem 41: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\text{Log}\left[-\frac{2\,x\left(d\sqrt{-\frac{e}{d}}-e\,x\right)}{d+e\,x^2}\right]}{d+e\,x^2}\,dx$$

Optimal (type 4, 50 leaves, 1 step):

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

Result (type 4, 674 leaves) :

$$\frac{1}{4\sqrt{d}\,\sqrt{e}}\left(-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}[x]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]+\right.$$

$$i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]-i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2-$$

$$4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{1}{\sqrt{-\frac{e}{d}}}+x\right]-2\,i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+$$

$$2\,i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+2\,i\,\text{Log}[x]\,\text{Log}\left[1-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-$$

$$2\,i\,\text{Log}[x]\,\text{Log}\left[1+\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-2\,i\,\text{Log}\left[\frac{1}{\sqrt{-\frac{e}{d}}}+x\right]\text{Log}\left[\frac{-i\sqrt{d}\,\sqrt{e}+e\,x}{-i\sqrt{d}\,\sqrt{e}+d\sqrt{-\frac{e}{d}}}\right]+$$

$$2\,i\,\text{Log}\left[\frac{1}{\sqrt{-\frac{e}{d}}}+x\right]\text{Log}\left[\frac{\sqrt{e}-\frac{i\,e\,x}{\sqrt{d}}}{\sqrt{e}-i\sqrt{d}\,\sqrt{-\frac{e}{d}}}\right]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{2\,e\,x\left(\frac{1}{\sqrt{-\frac{e}{d}}}+x\right)}{d+e\,x^2}\right]-$$

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

$$\left.2\,i\,\text{PolyLog}\left[2,\frac{\sqrt{e}\left(\frac{1}{\sqrt{-\frac{e}{d}}}+x\right)}{i\sqrt{d}+\frac{\sqrt{e}}{\sqrt{-\frac{e}{d}}}}\right]+2\,i\,\text{PolyLog}\left[2,\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]-2\,i\,\text{PolyLog}\left[2,\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]\right)$$

Problem 42: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[\frac{2 x \left(\frac{d \sqrt{e}}{\sqrt{-d}}+e x\right)}{d+e x^2}\right]}{d+e x^2} \, dx$$

Optimal (type 4, 53 leaves, 1 step):

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

Result (type 4, 654 leaves):

$$\frac{1}{4 \sqrt{d} \sqrt{e}} \left(-4\,\text{ArcTan}\left[\frac{\sqrt{e}\ x}{\sqrt{d}}\right] \text{Log}[x] - 4\,\text{ArcTan}\left[\frac{\sqrt{e}\ x}{\sqrt{d}}\right] \text{Log}\left[-\frac{\sqrt{-d}}{\sqrt{e}}+x\right] + 4\,\text{ArcTan}\left[\frac{\sqrt{e}\ x}{\sqrt{d}}\right] \text{Log}\left[-\frac{i \sqrt{d}}{\sqrt{e}}+x\right] + i\,\text{Log}\left[-\frac{i \sqrt{d}}{\sqrt{e}}+x\right]^2 + 4\,\text{ArcTan}\left[\frac{\sqrt{e}\ x}{\sqrt{d}}\right] \text{Log}\left[\frac{i \sqrt{d}}{\sqrt{e}}+x\right] - i\,\text{Log}\left[\frac{i \sqrt{d}}{\sqrt{e}}+x\right]^2 - 2 i\,\text{Log}\left[-\frac{\sqrt{-d}}{\sqrt{e}}+x\right] \text{Log}\left[\frac{-i \sqrt{d}+\sqrt{e}\ x}{\sqrt{-d}-i \sqrt{d}}\right] + 2 i\,\text{Log}\left[-\frac{\sqrt{-d}}{\sqrt{e}}+x\right] \text{Log}\left[\frac{i \sqrt{d}+\sqrt{e}\ x}{\sqrt{-d}+i \sqrt{d}}\right] - 2 i\,\text{Log}\left[-\frac{i \sqrt{d}}{\sqrt{e}}+x\right] \text{Log}\left[\frac{1}{2}-\frac{i \sqrt{e}\ x}{2 \sqrt{d}}\right] + 2 i\,\text{Log}\left[\frac{i \sqrt{d}}{\sqrt{e}}+x\right] \text{Log}\left[\frac{1}{2}+\frac{i \sqrt{e}\ x}{2 \sqrt{d}}\right] + 2 i\,\text{Log}[x]\,\text{Log}\left[1-\frac{i \sqrt{e}\ x}{\sqrt{d}}\right] - 2 i\,\text{Log}[x]\,\text{Log}\left[1+\frac{i \sqrt{e}\ x}{\sqrt{d}}\right] + 4\,\text{ArcTan}\left[\frac{\sqrt{e}\ x}{\sqrt{d}}\right] \text{Log}\left[\frac{2 \left(-\sqrt{-d} \sqrt{e}\ x+e x^2\right)}{d+e x^2}\right] - 2 i\,\text{PolyLog}\left[2,\ -\frac{i \sqrt{e}\ x}{\sqrt{d}}\right] + 2 i\,\text{PolyLog}\left[2,\ \frac{i \sqrt{e}\ x}{\sqrt{d}}\right] - 2 i\,\text{PolyLog}\left[2,\ \frac{\sqrt{-d}-\sqrt{e}\ x}{\sqrt{-d}-i \sqrt{d}}\right] + 2 i\,\text{PolyLog}\left[2,\ \frac{\sqrt{-d}-\sqrt{e}\ x}{\sqrt{-d}+i \sqrt{d}}\right] + 2 i\,\text{PolyLog}\left[2,\ \frac{1}{2}-\frac{i \sqrt{e}\ x}{2 \sqrt{d}}\right] - 2 i\,\text{PolyLog}\left[2,\ \frac{1}{2}+\frac{i \sqrt{e}\ x}{2 \sqrt{d}}\right]\right)$$

Problem 43: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[-\frac{2 x \left(\frac{d \sqrt{e}}{\sqrt{-d}}-e x\right)}{d+e x^2}\right]}{d+e x^2} \, dx$$

Optimal (type 4, 52 leaves, 1 step):

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

Result (type 4, 651 leaves) :

$$\frac{1}{4\sqrt{d}\,\sqrt{e}}\left(-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}[x]-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{\sqrt{-d}}{\sqrt{e}}+x\right]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]+\right.$$
$$i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]-i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2-$$
$$2\,i\,\text{Log}\left[\frac{\sqrt{-d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{i\left(\sqrt{d}+i\sqrt{e}\,x\right)}{\sqrt{-d}+i\sqrt{d}}\right]+2\,i\,\text{Log}\left[\frac{\sqrt{-d}}{\sqrt{e}}+x\right]\text{Log}\left[-\frac{i\sqrt{d}+\sqrt{e}\,x}{\sqrt{-d}-i\sqrt{d}}\right]-$$
$$2\,i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+2\,i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+$$
$$2\,i\,\text{Log}[x]\,\text{Log}\left[1-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-2\,i\,\text{Log}[x]\,\text{Log}\left[1+\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+$$
$$4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{2\left(\sqrt{-d}\,\sqrt{e}\,x+e\,x^2\right)}{d+e\,x^2}\right]-2\,i\,\text{PolyLog}\left[2,\,-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+$$
$$2\,i\,\text{PolyLog}\left[2,\,\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+2\,i\,\text{PolyLog}\left[2,\,\frac{\sqrt{-d}+\sqrt{e}\,x}{\sqrt{-d}-i\sqrt{d}}\right]-2\,i\,\text{PolyLog}\left[2,\,\frac{\sqrt{-d}+\sqrt{e}\,x}{\sqrt{-d}+i\sqrt{d}}\right]+$$
$$\left.2\,i\,\text{PolyLog}\left[2,\,\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]-2\,i\,\text{PolyLog}\left[2,\,\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]\right)$$

Problem 44: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\text{Log}\left[\frac{2x\left(\sqrt{d}\,\sqrt{-e}+e\,x\right)}{d+e\,x^2}\right]}{d+e\,x^2}\,dx$$

Optimal (type 4, 49 leaves, 1 step) :

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

Result (type 4, 701 leaves) :

$$\frac{1}{4\sqrt{d}\,\sqrt{e}}\left(-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\,\text{Log}[x]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]+\right.$$
$$i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]-i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2-$$
$$4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\,\text{Log}\left[\frac{\sqrt{d}\,e}{(-e)^{3/2}}+x\right]+2\,i\,\text{Log}\left[\frac{\sqrt{d}\,e}{(-e)^{3/2}}+x\right]\,\text{Log}\left[\frac{\sqrt{-e}\left(\sqrt{d}-i\sqrt{e}\,x\right)}{\sqrt{d}\left(\sqrt{-e}-i\sqrt{e}\right)}\right]-$$
$$2\,i\,\text{Log}\left[\frac{\sqrt{d}\,e}{(-e)^{3/2}}+x\right]\,\text{Log}\left[\frac{\sqrt{-e}\left(\sqrt{d}+i\sqrt{e}\,x\right)}{\sqrt{d}\left(\sqrt{-e}+i\sqrt{e}\right)}\right]-2\,i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\,\text{Log}\left[\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+$$
$$2\,i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\,\text{Log}\left[\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+2\,i\,\text{Log}[x]\,\text{Log}\left[1-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-$$
$$2\,i\,\text{Log}[x]\,\text{Log}\left[1+\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\,\text{Log}\left[\frac{2\,x\left(\sqrt{d}\,\sqrt{-e}+e\,x\right)}{d+e\,x^2}\right]-$$
$$2\,i\,\text{PolyLog}\left[2,-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+2\,i\,\text{PolyLog}\left[2,\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+$$
$$2\,i\,\text{PolyLog}\left[2,\frac{i\sqrt{e}\left(-\sqrt{d}+\sqrt{-e}\,x\right)}{\sqrt{d}\left(\sqrt{-e}-i\sqrt{e}\right)}\right]-2\,i\,\text{PolyLog}\left[2,-\frac{i\sqrt{e}\left(-\sqrt{d}+\sqrt{-e}\,x\right)}{\sqrt{d}\left(\sqrt{-e}+i\sqrt{e}\right)}\right]+$$
$$\left.2\,i\,\text{PolyLog}\left[2,\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]-2\,i\,\text{PolyLog}\left[2,\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]\right)$$

Problem 45: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\text{Log}\left[-\frac{2\,x\left(\sqrt{d}\,\sqrt{-e}-e\,x\right)}{d+e\,x^2}\right]}{d+e\,x^2}\,dx$$

Optimal (type 4, 50 leaves, 1 step):

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

Result (type 4, 695 leaves):

$$\frac{1}{4\sqrt{d}\,\sqrt{e}}\Bigg(-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}[x]-4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{\sqrt{d}}{\sqrt{-e}}+x\right]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]+$$

$$i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]-i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]^2+$$

$$2\,i\,\text{Log}\left[\frac{\sqrt{d}}{\sqrt{-e}}+x\right]\text{Log}\left[\frac{\sqrt{-e}\,\left(\sqrt{d}-i\sqrt{e}\,x\right)}{\sqrt{d}\,\left(\sqrt{-e}+i\sqrt{e}\right)}\right]-2\,i\,\text{Log}\left[\frac{\sqrt{d}}{\sqrt{-e}}+x\right]\text{Log}\left[\frac{\sqrt{-e}\,\left(\sqrt{d}+i\sqrt{e}\,x\right)}{\sqrt{d}\,\left(\sqrt{-e}-i\sqrt{e}\right)}\right]-$$

$$2\,i\,\text{Log}\left[-\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+2\,i\,\text{Log}\left[\frac{i\sqrt{d}}{\sqrt{e}}+x\right]\text{Log}\left[\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]+$$

$$2\,i\,\text{Log}[x]\,\text{Log}\left[1-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-2\,i\,\text{Log}[x]\,\text{Log}\left[1+\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+4\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]$$

$$\text{Log}\left[\frac{2\,x\,\left(-\sqrt{d}\,\sqrt{-e}+e\,x\right)}{d+e\,x^2}\right]-2\,i\,\text{PolyLog}\left[2,-\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]+2\,i\,\text{PolyLog}\left[2,\frac{i\sqrt{e}\,x}{\sqrt{d}}\right]-$$

$$2\,i\,\text{PolyLog}\left[2,-\frac{i\sqrt{e}\,\left(\sqrt{d}+\sqrt{-e}\,x\right)}{\sqrt{d}\,\left(\sqrt{-e}-i\sqrt{e}\right)}\right]+2\,i\,\text{PolyLog}\left[2,\frac{i\sqrt{e}\,\left(\sqrt{d}+\sqrt{-e}\,x\right)}{\sqrt{d}\,\left(\sqrt{-e}+i\sqrt{e}\right)}\right]+$$

$$2\,i\,\text{PolyLog}\left[2,\frac{1}{2}-\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]-2\,i\,\text{PolyLog}\left[2,\frac{1}{2}+\frac{i\sqrt{e}\,x}{2\sqrt{d}}\right]\Bigg)$$

Problem 93: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Log}\left[d\,\left(a+b\,x+c\,x^2\right)^n\right]}{a\,e+b\,e\,x+c\,e\,x^2}\,dx$$

Optimal (type 4, 258 leaves, 8 steps):

$$\frac{2\,n\,\text{ArcTanh}\left[\frac{b+2\,c\,x}{\sqrt{b^2-4\,a\,c}}\right]^2}{\sqrt{b^2-4\,a\,c}\;e}-\frac{4\,n\,\text{ArcTanh}\left[\frac{b+2\,c\,x}{\sqrt{b^2-4\,a\,c}}\right]\text{Log}\left[\frac{2}{1-\frac{b}{\sqrt{b^2-4\,a\,c}}-\frac{2\,c\,x}{\sqrt{b^2-4\,a\,c}}}\right]}{\sqrt{b^2-4\,a\,c}\;e}-$$

$$\frac{2\,\text{ArcTanh}\left[\frac{b+2\,c\,x}{\sqrt{b^2-4\,a\,c}}\right]\text{Log}\left[d\,\left(a+b\,x+c\,x^2\right)^n\right]}{\sqrt{b^2-4\,a\,c}\;e}-\frac{2\,n\,\text{PolyLog}\left[2,-\frac{1+\frac{b}{\sqrt{b^2-4\,a\,c}}+\frac{2\,c\,x}{\sqrt{b^2-4\,a\,c}}}{1-\frac{b}{\sqrt{b^2-4\,a\,c}}-\frac{2\,c\,x}{\sqrt{b^2-4\,a\,c}}}\right]}{\sqrt{b^2-4\,a\,c}\;e}$$

Result (type 4, 555 leaves):

$$-\frac{1}{2\sqrt{-\left(b^2-4ac\right)^2}\,e}$$

$$\left(4\sqrt{b^2-4ac}\;n\,\text{ArcTan}\left[\frac{b+2cx}{\sqrt{-b^2+4ac}}\right]\text{Log}\left[\frac{b-\sqrt{b^2-4ac}}{2c}+x\right]-\sqrt{-b^2+4ac}\;n\right.$$

$$\text{Log}\left[\frac{b-\sqrt{b^2-4ac}}{2c}+x\right]^2+4\sqrt{b^2-4ac}\;n\,\text{ArcTan}\left[\frac{b+2cx}{\sqrt{-b^2+4ac}}\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]-$$

$$2\sqrt{-b^2+4ac}\;n\,\text{Log}\left[\frac{-b+\sqrt{b^2-4ac}-2cx}{2\sqrt{b^2-4ac}}\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]+$$

$$\sqrt{-b^2+4ac}\;n\,\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]^2+$$

$$2\sqrt{-b^2+4ac}\;n\,\text{Log}\left[\frac{b-\sqrt{b^2-4ac}}{2c}+x\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2\sqrt{b^2-4ac}}\right]-$$

$$4\sqrt{b^2-4ac}\;\text{ArcTan}\left[\frac{b+2cx}{\sqrt{-b^2+4ac}}\right]\text{Log}\left[d\left(a+x\left(b+cx\right)\right)^n\right]+$$

$$2\sqrt{-b^2+4ac}\;n\,\text{PolyLog}\left[2,\frac{-b+\sqrt{b^2-4ac}-2cx}{2\sqrt{b^2-4ac}}\right]-$$

$$\left.2\sqrt{-b^2+4ac}\;n\,\text{PolyLog}\left[2,\frac{b+\sqrt{b^2-4ac}+2cx}{2\sqrt{b^2-4ac}}\right]\right)$$

Problem 94: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Log}\left[g\left(a+bx+cx^2\right)^n\right]}{d+ex^2}\,dx$$

Optimal (type 4, 762 leaves, 20 steps) :

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

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

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

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

$$\frac{\operatorname{Log}\left[\sqrt{-d}-\sqrt{e}\, x\right] \operatorname{Log}\left[g\left(a+b x+c x^2\right)^n\right]}{2 \sqrt{-d} \sqrt{e}}-\frac{\operatorname{Log}\left[\sqrt{-d}+\sqrt{e}\, x\right] \operatorname{Log}\left[g\left(a+b x+c x^2\right)^n\right]}{2 \sqrt{-d} \sqrt{e}}-$$

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

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

Result (type 4, 736 leaves) :

$$-\frac{1}{2\sqrt{d}\sqrt{e}}\left(2\,n\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{b-\sqrt{b^2-4\,a\,c}}{2\,c}+x\right]+2\,n\,\text{ArcTan}\left[\frac{\sqrt{e}\,x}{\sqrt{d}}\right]\text{Log}\left[\frac{b+\sqrt{b^2-4\,a\,c}+2\,c\,x}{2\,c}\right]-\right.$$

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

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

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

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

$$\text{Log}\left[g\left(a+x\left(b+c\,x\right)\right)^n\right]+i\,n\,\text{PolyLog}\left[2,\frac{\sqrt{e}\left(-b+\sqrt{b^2-4\,a\,c}-2\,c\,x\right)}{-2\,i\,c\sqrt{d}+\left(-b+\sqrt{b^2-4\,a\,c}\right)\sqrt{e}}\right]-$$

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

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

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

Problem 97: Result more than twice size of optimal antiderivative.

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

Optimal (type 4, 587 leaves, 27 steps):

$$8 n^2 x - \frac{4 \sqrt{b^2-4 a c}\, n^2 \text{ArcTanh}\left[\frac{b+2 c x}{\sqrt{b^2-4 a c}}\right]}{c} - \frac{\left(b-\sqrt{b^2-4 a c}\right) n^2 \text{Log}\left[b-\sqrt{b^2-4 a c}+2 c x\right]^2}{2 c} -$$

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

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

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

$$\frac{2 b n^2 \text{Log}\left[a+b x+c x^2\right]}{c} - 4 n x \text{Log}\left[d \left(a+b x+c x^2\right)^n\right] + \frac{1}{c}$$

$$\left(b-\sqrt{b^2-4 a c}\right) n \text{Log}\left[b-\sqrt{b^2-4 a c}+2 c x\right] \text{Log}\left[d \left(a+b x+c x^2\right)^n\right] + \frac{1}{c}$$

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

$$\frac{\left(b-\sqrt{b^2-4 a c}\right) n^2 \text{PolyLog}\left[2, -\frac{b-\sqrt{b^2-4 a c}+2 c x}{2 \sqrt{b^2-4 a c}}\right]}{c} - \frac{\left(b+\sqrt{b^2-4 a c}\right) n^2 \text{PolyLog}\left[2, \frac{b+\sqrt{b^2-4 a c}+2 c x}{2 \sqrt{b^2-4 a c}}\right]}{c}$$

Result (type 4, 1447 leaves):

$$\frac{1}{2 c \sqrt{-b^2+4 a c}}$$

$$\left(8 b \sqrt{-b^2+4 a c}\, n^2 + 16 c \sqrt{-b^2+4 a c}\, n^2 x + 4 \sqrt{-\left(b^2-4 a c\right)^2}\, n^2 \text{Log}\left[\frac{b-\sqrt{b^2-4 a c}}{2 c}+x\right] -\right.$$

$$4 b \sqrt{-b^2+4 a c}\, n^2 \text{Log}\left[\frac{b-\sqrt{b^2-4 a c}}{2 c}+x\right] + 4 b^2 n^2 \text{ArcTan}\left[\frac{b+2 c x}{\sqrt{-b^2+4 a c}}\right]$$

$$\text{Log}\left[\frac{b-\sqrt{b^2-4 a c}}{2 c}+x\right] - 16 a c n^2 \text{ArcTan}\left[\frac{b+2 c x}{\sqrt{-b^2+4 a c}}\right] \text{Log}\left[\frac{b-\sqrt{b^2-4 a c}}{2 c}+x\right] -$$

$$\sqrt{-\left(b^2-4 a c\right)^2}\, n^2 \text{Log}\left[\frac{b-\sqrt{b^2-4 a c}}{2 c}+x\right]^2 + b \sqrt{-b^2+4 a c}\, n^2 \text{Log}\left[\frac{b-\sqrt{b^2-4 a c}}{2 c}+x\right]^2 -$$

$$4 \sqrt{-\left(b^2-4 a c\right)^2}\, n^2 \text{Log}\left[\frac{b+\sqrt{b^2-4 a c}+2 c x}{2 c}\right] -$$

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

$$4 b^2 n^2 \text{ArcTan}\left[\frac{b+2 c x}{\sqrt{-b^2+4 a c}}\right] \text{Log}\left[\frac{b+\sqrt{b^2-4 a c}+2 c x}{2 c}\right] -$$

$$16 a c n^2 \text{ArcTan}\left[\frac{b+2 c x}{\sqrt{-b^2+4 a c}}\right] \text{Log}\left[\frac{b+\sqrt{b^2-4 a c}+2 c x}{2 c}\right] -$$

$$2\sqrt{-\left(b^2-4ac\right)^2}\ n^2\,\text{Log}\left[\frac{-b+\sqrt{b^2-4ac}-2cx}{2\sqrt{b^2-4ac}}\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]+$$
$$2b\sqrt{-b^2+4ac}\ n^2\,\text{Log}\left[\frac{-b+\sqrt{b^2-4ac}-2cx}{2\sqrt{b^2-4ac}}\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]+$$
$$\sqrt{-\left(b^2-4ac\right)^2}\ n^2\,\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]^2+b\sqrt{-b^2+4ac}\ n^2\,\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]^2+$$
$$2\sqrt{-\left(b^2-4ac\right)^2}\ n^2\,\text{Log}\left[\frac{b-\sqrt{b^2-4ac}}{2c}+x\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2\sqrt{b^2-4ac}}\right]+$$
$$2b\sqrt{-b^2+4ac}\ n^2\,\text{Log}\left[\frac{b-\sqrt{b^2-4ac}}{2c}+x\right]\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2\sqrt{b^2-4ac}}\right]-$$
$$2b\sqrt{-b^2+4ac}\ n^2\,\text{Log}\left[\frac{b-\sqrt{b^2-4ac}}{2c}+x\right]\text{Log}\left[a+x\left(b+cx\right)\right]-$$
$$2b\sqrt{-b^2+4ac}\ n^2\,\text{Log}\left[\frac{b+\sqrt{b^2-4ac}+2cx}{2c}\right]\text{Log}\left[a+x\left(b+cx\right)\right]-$$
$$8c\sqrt{-b^2+4ac}\ n\,x\,\text{Log}\left[d\left(a+x\left(b+cx\right)\right)^n\right]-4b^2\,n\,\text{ArcTan}\left[\frac{b+2cx}{\sqrt{-b^2+4ac}}\right]$$
$$\text{Log}\left[d\left(a+x\left(b+cx\right)\right)^n\right]+16\,a\,c\,n\,\text{ArcTan}\left[\frac{b+2cx}{\sqrt{-b^2+4ac}}\right]\text{Log}\left[d\left(a+x\left(b+cx\right)\right)^n\right]+$$
$$2b\sqrt{-b^2+4ac}\ n\,\text{Log}\left[a+x\left(b+cx\right)\right]\text{Log}\left[d\left(a+x\left(b+cx\right)\right)^n\right]+$$
$$2c\sqrt{-b^2+4ac}\ x\,\text{Log}\left[d\left(a+x\left(b+cx\right)\right)^n\right]^2+$$
$$2\left(\sqrt{-\left(b^2-4ac\right)^2}+b\sqrt{-b^2+4ac}\right)n^2\,\text{PolyLog}\left[2,\frac{-b+\sqrt{b^2-4ac}-2cx}{2\sqrt{b^2-4ac}}\right]-$$
$$2\left(\sqrt{-\left(b^2-4ac\right)^2}-b\sqrt{-b^2+4ac}\right)n^2\,\text{PolyLog}\left[2,\frac{b+\sqrt{b^2-4ac}+2cx}{2\sqrt{b^2-4ac}}\right]\Bigg)$$

Problem 100: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Log}\left[-1+x+x^2\right]^2}{x^3}\,dx$$

Optimal (type 4, 443 leaves, 34 steps):

$$\text{Log}[x]-\frac{1}{2}\left(1+\sqrt{5}\right)\text{Log}\left[1-\sqrt{5}+2x\right]+3\,\text{Log}\left[\frac{1}{2}\left(-1+\sqrt{5}\right)\right]\text{Log}\left[1-\sqrt{5}+2x\right]-$$
$$\frac{1}{4}\left(3+\sqrt{5}\right)\text{Log}\left[1-\sqrt{5}+2x\right]^2-\frac{1}{2}\left(1-\sqrt{5}\right)\text{Log}\left[1+\sqrt{5}+2x\right]-$$
$$\frac{1}{2}\left(3-\sqrt{5}\right)\text{Log}\left[-\frac{1-\sqrt{5}+2x}{2\sqrt{5}}\right]\text{Log}\left[1+\sqrt{5}+2x\right]-\frac{1}{4}\left(3-\sqrt{5}\right)\text{Log}\left[1+\sqrt{5}+2x\right]^2-$$
$$\frac{1}{2}\left(3+\sqrt{5}\right)\text{Log}\left[1-\sqrt{5}+2x\right]\text{Log}\left[\frac{1+\sqrt{5}+2x}{2\sqrt{5}}\right]+3\,\text{Log}[x]\,\text{Log}\left[1+\frac{2x}{1+\sqrt{5}}\right]+$$
$$\frac{\text{Log}\left[-1+x+x^2\right]}{x}-3\,\text{Log}[x]\,\text{Log}\left[-1+x+x^2\right]+\frac{1}{2}\left(3+\sqrt{5}\right)\text{Log}\left[1-\sqrt{5}+2x\right]\text{Log}\left[-1+x+x^2\right]+$$
$$\frac{1}{2}\left(3-\sqrt{5}\right)\text{Log}\left[1+\sqrt{5}+2x\right]\text{Log}\left[-1+x+x^2\right]-\frac{\text{Log}\left[-1+x+x^2\right]^2}{2x^2}+$$
$$3\,\text{PolyLog}\left[2,-\frac{2x}{1+\sqrt{5}}\right]-\frac{1}{2}\left(3+\sqrt{5}\right)\text{PolyLog}\left[2,-\frac{1-\sqrt{5}+2x}{2\sqrt{5}}\right]-$$
$$\frac{1}{2}\left(3-\sqrt{5}\right)\text{PolyLog}\left[2,\frac{1+\sqrt{5}+2x}{2\sqrt{5}}\right]-3\,\text{PolyLog}\left[2,1+\frac{2x}{1-\sqrt{5}}\right]$$

Result (type 4, 955 leaves) :

$$\frac{1}{20}\left(-10\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]-10\,\sqrt{5}\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]+20\,\text{Log}[x]+\right.$$
$$2\,\sqrt{5}\,\text{Log}[100]\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]-30\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]-$$
$$10\,\sqrt{5}\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]+60\,\text{Log}[x]\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]-$$
$$60\,\text{Log}\left[\frac{2\,x}{-1+\sqrt{5}}\right]\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]+15\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]^2+5\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]^2+$$
$$\sqrt{5}\,\text{Log}[8]\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]-30\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]-$$
$$10\,\sqrt{5}\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]+15\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]^2-$$
$$2\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]^2-10\,\text{Log}\left[1+\sqrt{5}+2\,x\right]+10\,\sqrt{5}\,\text{Log}\left[1+\sqrt{5}+2\,x\right]-$$
$$30\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]\,\text{Log}\left[1+\sqrt{5}+2\,x\right]+10\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]\,\text{Log}\left[1+\sqrt{5}+2\,x\right]-$$
$$30\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]\,\text{Log}\left[1+\sqrt{5}+2\,x\right]+7\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]\,\text{Log}\left[1+\sqrt{5}+2\,x\right]+$$
$$30\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]\,\text{Log}\left[\frac{1+\sqrt{5}+2\,x}{2\,\sqrt{5}}\right]-6\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]\,\text{Log}\left[\frac{1+\sqrt{5}+2\,x}{2\,\sqrt{5}}\right]+$$
$$30\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]\,\text{Log}\left[\frac{1}{10}\left(5-\sqrt{5}-2\,\sqrt{5}\,x\right)\right]+$$
$$10\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}\left(1+\sqrt{5}\right)+x\right]\,\text{Log}\left[\frac{1}{10}\left(5-\sqrt{5}-2\,\sqrt{5}\,x\right)\right]-$$
$$4\,\sqrt{5}\,\text{Log}\left[\frac{1}{2}-\frac{\sqrt{5}}{2}+x\right]\,\text{Log}\left[5+\sqrt{5}+2\,\sqrt{5}\,x\right]+60\,\text{Log}[x]\,\text{Log}\left[1+\frac{2\,x}{1+\sqrt{5}}\right]+$$
$$\frac{20\,\text{Log}\left[-1+x+x^2\right]}{x}+30\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]\,\text{Log}\left[-1+x+x^2\right]+$$
$$10\,\sqrt{5}\,\text{Log}\left[-1+\sqrt{5}-2\,x\right]\,\text{Log}\left[-1+x+x^2\right]-60\,\text{Log}[x]\,\text{Log}\left[-1+x+x^2\right]+$$
$$30\,\text{Log}\left[1+\sqrt{5}+2\,x\right]\,\text{Log}\left[-1+x+x^2\right]-10\,\sqrt{5}\,\text{Log}\left[1+\sqrt{5}+2\,x\right]\,\text{Log}\left[-1+x+x^2\right]-$$
$$\frac{10\,\text{Log}\left[-1+x+x^2\right]^2}{x^2}-10\left(-3+\sqrt{5}\right)\text{PolyLog}\left[2,\frac{-1+\sqrt{5}-2\,x}{2\,\sqrt{5}}\right]-60\,\text{PolyLog}\left[2,\frac{-1+\sqrt{5}-2\,x}{-1+\sqrt{5}}\right]+$$
$$\left.60\,\text{PolyLog}\left[2,-\frac{2\,x}{1+\sqrt{5}}\right]+30\,\text{PolyLog}\left[2,\frac{1+\sqrt{5}+2\,x}{2\,\sqrt{5}}\right]+10\,\sqrt{5}\,\text{PolyLog}\left[2,\frac{1+\sqrt{5}+2\,x}{2\,\sqrt{5}}\right]\right)$$

Problem 108: Result unnecessarily involves imaginary or complex numbers.

$$\int x^{3/2}\,\text{Log}\left[-1+4\,x+4\,\sqrt{(-1+x)\,x}\right]\,dx$$

Optimal (type 3, 187 leaves, 15 steps):

$$-\frac{\sqrt{x}}{160}+\frac{x^{3/2}}{60}-\frac{2x^{5/2}}{25}-\frac{17\sqrt{-x+x^2}}{32\sqrt{x}}-\frac{71\left(-x+x^2\right)^{3/2}}{300x^{3/2}}-\frac{2\left(-x+x^2\right)^{3/2}}{25\sqrt{x}}-\frac{\sqrt{-x+x^2}\,\text{ArcTan}\left[\frac{2}{3}\sqrt{2}\sqrt{-1+x}\right]}{320\sqrt{2}\sqrt{-1+x}\sqrt{x}}+\frac{\text{ArcTan}\left[2\sqrt{2}\sqrt{x}\right]}{320\sqrt{2}}+\frac{2}{5}x^{5/2}\,\text{Log}\left[-1+4x+4\sqrt{-x+x^2}\right]$$

Result (type 3, 232 leaves):

$$\frac{1}{38400}\left(-240\sqrt{x}+640x^{3/2}-3072x^{5/2}-\frac{11312\sqrt{(-1+x)\,x}}{\sqrt{x}}-6016\sqrt{x}\sqrt{(-1+x)\,x}-3072x^{3/2}\sqrt{(-1+x)\,x}+60\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\sqrt{x}\right]-60\sqrt{2}\,\text{ArcTan}\left[\frac{2\sqrt{2}\sqrt{(-1+x)\,x}}{3\sqrt{x}}\right]-30\,i\sqrt{2}\,\text{Log}\left[4\,(1+8x)^2\right]+15\,i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x-6\sqrt{(-1+x)\,x}\right)\right]+15360x^{5/2}\,\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]+15\,i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x+6\sqrt{(-1+x)\,x}\right)\right]\right)$$

Problem 109: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{x}\,\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]dx$$

Optimal (type 3, 158 leaves, 13 steps):

$$\frac{\sqrt{x}}{12}-\frac{2x^{3/2}}{9}-\frac{11\sqrt{-x+x^2}}{12\sqrt{x}}-\frac{2\left(-x+x^2\right)^{3/2}}{9x^{3/2}}+\frac{\sqrt{-x+x^2}\,\text{ArcTan}\left[\frac{2}{3}\sqrt{2}\sqrt{-1+x}\right]}{24\sqrt{2}\sqrt{-1+x}\sqrt{x}}-\frac{\text{ArcTan}\left[2\sqrt{2}\sqrt{x}\right]}{24\sqrt{2}}+\frac{2}{3}x^{3/2}\,\text{Log}\left[-1+4x+4\sqrt{-x+x^2}\right]$$

Result (type 3, 209 leaves):

$$\frac{1}{576}\left(48\sqrt{x}-128x^{3/2}-\frac{400\sqrt{(-1+x)\,x}}{\sqrt{x}}-128\sqrt{x}\sqrt{(-1+x)\,x}-12\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\sqrt{x}\right]+12\sqrt{2}\,\text{ArcTan}\left[\frac{2\sqrt{2}\sqrt{(-1+x)\,x}}{3\sqrt{x}}\right]+6\,i\sqrt{2}\,\text{Log}\left[4\,(1+8x)^2\right]-3\,i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x-6\sqrt{(-1+x)\,x}\right)\right]+384x^{3/2}\,\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]-3\,i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x+6\sqrt{(-1+x)\,x}\right)\right]\right)$$

Problem 110: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]}{\sqrt{x}}\,dx$$

Optimal (type 3, 118 leaves, 12 steps):

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

Result (type 3, 186 leaves):

$$\frac{1}{8}\left(-16\sqrt{x}-\frac{16\sqrt{(-1+x)\,x}}{\sqrt{x}}+4\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\,\sqrt{x}\right]-4\sqrt{2}\,\text{ArcTan}\left[\frac{2\sqrt{2}\,\sqrt{(-1+x)\,x}}{3\sqrt{x}}\right]-2\,i\sqrt{2}\,\text{Log}\left[4\,(1+8x)^2\right]+i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x-6\sqrt{(-1+x)\,x}\right)\right]+16\sqrt{x}\,\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]+i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x+6\sqrt{(-1+x)\,x}\right)\right]\right)$$

Problem 111: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]}{x^{3/2}}\,dx$$

Optimal (type 3, 114 leaves, 15 steps):

$$-\frac{4\sqrt{2}\,\sqrt{-x+x^2}\,\text{ArcTan}\left[\frac{2}{3}\sqrt{2}\,\sqrt{-1+x}\right]}{\sqrt{-1+x}\,\sqrt{x}}+4\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\,\sqrt{x}\right]-8\,\text{ArcTan}\left[\frac{\sqrt{x}}{\sqrt{-x+x^2}}\right]-\frac{2\,\text{Log}\left[-1+4x+4\sqrt{-x+x^2}\right]}{\sqrt{x}}$$

Result (type 3, 177 leaves):

$$4\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\,\sqrt{x}\right]+8\,\text{ArcTan}\left[\frac{\sqrt{(-1+x)\,x}}{\sqrt{x}}\right]-4\sqrt{2}\,\text{ArcTan}\left[\frac{2\sqrt{2}\,\sqrt{(-1+x)\,x}}{3\sqrt{x}}\right]-2\,i\sqrt{2}\,\text{Log}\left[4\,(1+8x)^2\right]+i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x-6\sqrt{(-1+x)\,x}\right)\right]-\frac{2\,\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]}{\sqrt{x}}+i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x+6\sqrt{(-1+x)\,x}\right)\right]$$

Problem 112: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]}{x^{5/2}}\,dx$$

Optimal (type 3, 151 leaves, 18 steps):

$$-\frac{16}{3\sqrt{x}}+\frac{4\sqrt{-x+x^2}}{3x^{3/2}}+\frac{32\sqrt{2}\sqrt{-x+x^2}\,\text{ArcTan}\left[\frac{2}{3}\sqrt{2}\sqrt{-1+x}\right]}{3\sqrt{-1+x}\sqrt{x}}-\frac{32}{3}\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\sqrt{x}\right]+\frac{44}{3}\text{ArcTan}\left[\frac{\sqrt{x}}{\sqrt{-x+x^2}}\right]-\frac{2\,\text{Log}\left[-1+4x+4\sqrt{-x+x^2}\right]}{3x^{3/2}}$$

Result (type 3, 204 leaves):

$$\frac{2}{3}\left(-\frac{8}{\sqrt{x}}+\frac{2\sqrt{(-1+x)\,x}}{x^{3/2}}-16\sqrt{2}\,\text{ArcTan}\left[2\sqrt{2}\sqrt{x}\right]-22\,\text{ArcTan}\left[\frac{\sqrt{(-1+x)\,x}}{\sqrt{x}}\right]+16\sqrt{2}\,\text{ArcTan}\left[\frac{2\sqrt{2}\sqrt{(-1+x)\,x}}{3\sqrt{x}}\right]+8\,i\sqrt{2}\,\text{Log}\left[4\,(1+8x)^2\right]-4\,i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x-6\sqrt{(-1+x)\,x}\right)\right]-\frac{\text{Log}\left[-1+4x+4\sqrt{(-1+x)\,x}\right]}{x^{3/2}}-4\,i\sqrt{2}\,\text{Log}\left[(1+8x)\left(1-10x+6\sqrt{(-1+x)\,x}\right)\right]\right)$$

Problem 118: Unable to integrate problem.

$$\int x^3\,\text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]dx$$

Optimal (type 4, 132 leaves, 5 steps):

$$-\frac{x^3\,\text{PolyLog}\left[2,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b\,c\,n\,\text{Log}[f]}+\frac{3x^2\,\text{PolyLog}\left[3,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b^2\,c^2\,n^2\,\text{Log}[f]^2}-\frac{6x\,\text{PolyLog}\left[4,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b^3\,c^3\,n^3\,\text{Log}[f]^3}+\frac{6\,\text{PolyLog}\left[5,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b^4\,c^4\,n^4\,\text{Log}[f]^4}$$

Result (type 8, 22 leaves):

$$\int x^3\,\text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]dx$$

Problem 119: Unable to integrate problem.

$$\int x^2\,\text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]dx$$

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

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

Result (type 8, 22 leaves):

$$\int x^2\,\text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]\,dx$$

Problem 120: Unable to integrate problem.

$$\int x\,\text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]\,dx$$

Optimal (type 4, 63 leaves, 3 steps):

$$-\frac{x\,\text{PolyLog}\left[2,\,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b\,c\,n\,\text{Log}[f]}+\frac{\text{PolyLog}\left[3,\,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b^2\,c^2\,n^2\,\text{Log}[f]^2}$$

Result (type 8, 20 leaves):

$$\int x\,\text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]\,dx$$

Problem 121: Attempted integration timed out after 120 seconds.

$$\int \text{Log}\left[1+e\left(f^{c\,(a+b\,x)}\right)^n\right]\,dx$$

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

$$-\frac{\text{PolyLog}\left[2,\,-e\left(f^{c\,(a+b\,x)}\right)^n\right]}{b\,c\,n\,\text{Log}[f]}$$

Result (type 1, 1 leaves):

???

Problem 123: Unable to integrate problem.

$$\int x^3\,\text{Log}\left[d+e\left(f^{c\,(a+b\,x)}\right)^n\right]\,dx$$

Optimal (type 4, 193 leaves, 6 steps):

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

Result (type 8, 22 leaves):

$$\int x^3\,\text{Log}\left[d+e\left(f^{c\,(a+b\,x)}\right)^n\right]\,dx$$

Problem 124: Unable to integrate problem.

$$\int x^2 \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right] dx$$

Optimal (type 4, 156 leaves, 5 steps):

$$\frac{1}{3} x^3 \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right]-\frac{1}{3} x^3 \operatorname{Log}\left[1+\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]-\frac{x^2 \operatorname{PolyLog}\left[2,-\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]}{b c n \operatorname{Log}[f]}+\frac{2 x \operatorname{PolyLog}\left[3,-\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]}{b^2 c^2 n^2 \operatorname{Log}[f]^2}-\frac{2 \operatorname{PolyLog}\left[4,-\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]}{b^3 c^3 n^3 \operatorname{Log}[f]^3}$$

Result (type 8, 22 leaves):

$$\int x^2 \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right] dx$$

Problem 125: Unable to integrate problem.

$$\int x \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right] dx$$

Optimal (type 4, 118 leaves, 4 steps):

$$\frac{1}{2} x^2 \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right]-\frac{1}{2} x^2 \operatorname{Log}\left[1+\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]-\frac{x \operatorname{PolyLog}\left[2,-\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]}{b c n \operatorname{Log}[f]}+\frac{\operatorname{PolyLog}\left[3,-\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]}{b^2 c^2 n^2 \operatorname{Log}[f]^2}$$

Result (type 8, 20 leaves):

$$\int x \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right] dx$$

Problem 126: Attempted integration timed out after 120 seconds.

$$\int \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right] dx$$

Optimal (type 4, 75 leaves, 4 steps):

$$x \operatorname{Log}\left[d+e\left(f^{c (a+b x)}\right)^n\right]-x \operatorname{Log}\left[1+\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]-\frac{\operatorname{PolyLog}\left[2,-\frac{e\left(f^{c (a+b x)}\right)^n}{d}\right]}{b c n \operatorname{Log}[f]}$$

Result (type 1, 1 leaves):

???

Problem 128: Attempted integration timed out after 120 seconds.

$$\int \text{Log}\left[b \left(F^{e (c+d x)}\right)^n + \pi\right] \, dx$$

Optimal (type 4, 39 leaves, 3 steps):

$$x \, \text{Log}[\pi] - \frac{\text{PolyLog}\left[2, -\frac{b \left(F^{e (c+d x)}\right)^n}{\pi}\right]}{d \, e \, n \, \text{Log}[F]}$$

Result (type 1, 1 leaves):

???

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

$$\int \frac{(1 + \text{Log}[x])^5}{x} \, dx$$

Optimal (type 3, 10 leaves, 2 steps):

$$\frac{1}{6} (1 + \text{Log}[x])^6$$

Result (type 3, 39 leaves):

$$\text{Log}[x] + \frac{5 \, \text{Log}[x]^2}{2} + \frac{10 \, \text{Log}[x]^3}{3} + \frac{5 \, \text{Log}[x]^4}{2} + \text{Log}[x]^5 + \frac{\text{Log}[x]^6}{6}$$

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

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

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

$$\text{ArcTanh}\left[\frac{\text{Log}[x]}{\sqrt{-3 + \text{Log}[x]^2}}\right]$$

Result (type 3, 42 leaves):

$$-\frac{1}{2} \text{Log}\left[1 - \frac{\text{Log}[x]}{\sqrt{-3 + \text{Log}[x]^2}}\right] + \frac{1}{2} \text{Log}\left[1 + \frac{\text{Log}[x]}{\sqrt{-3 + \text{Log}[x]^2}}\right]$$

Problem 189: Result more than twice size of optimal antiderivative.

$$\int \text{Cos}[x] \, \text{Log}[\text{Cos}[x]] \, dx$$

Optimal (type 3, 14 leaves, 4 steps):

$\text{ArcTanh}[\text{Sin}[x]] - \text{Sin}[x] + \text{Log}[\text{Cos}[x]]\,\text{Sin}[x]$

Result (type 3, 43 leaves):

$$-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right] - \text{Sin}\left[\frac{x}{2}\right]\right] + \text{Log}\left[\text{Cos}\left[\frac{x}{2}\right] + \text{Sin}\left[\frac{x}{2}\right]\right] - \text{Sin}[x] + \text{Log}[\text{Cos}[x]]\,\text{Sin}[x]$$

Problem 277: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[c\,\left(1+x^2\right)^n\right]}{1+x^2}\,dx$$

Optimal (type 4, 60 leaves, 5 steps):

$$i\,n\,\text{ArcTan}[x]^2 + 2\,n\,\text{ArcTan}[x]\,\text{Log}\left[\frac{2}{1+i\,x}\right] + \text{ArcTan}[x]\,\text{Log}\left[c\,\left(1+x^2\right)^n\right] + i\,n\,\text{PolyLog}\left[2,\,1-\frac{2}{1+i\,x}\right]$$

Result (type 4, 149 leaves):

$$\frac{1}{4}\left(-4\,n\,\text{ArcTan}[x]\,\text{Log}[-i+x] - i\,n\,\text{Log}[-i+x]^2 + 2\,i\,n\,\text{Log}[-i+x]\,\text{Log}\left[-\frac{1}{2}\,i\,(i+x)\right] - 4\,n\,\text{ArcTan}[x]\,\text{Log}[i+x] - 2\,i\,n\,\text{Log}\left[\frac{1}{2}\,(1+i\,x)\right]\,\text{Log}[i+x] + i\,n\,\text{Log}[i+x]^2 + 4\,\text{ArcTan}[x]\,\text{Log}\left[c\,\left(1+x^2\right)^n\right] + 2\,i\,n\,\text{PolyLog}\left[2,\,\frac{1}{2}+\frac{i\,x}{2}\right] - 2\,i\,n\,\text{PolyLog}\left[2,\,-\frac{1}{2}\,i\,(i+x)\right]\right)$$

Problem 278: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[\frac{x^2}{1+x^2}\right]}{1+x^2}\,dx$$

Optimal (type 4, 61 leaves, 5 steps):

$$i\,\text{ArcTan}[x]^2 - 2\,\text{ArcTan}[x]\,\text{Log}\left[2-\frac{2}{1-i\,x}\right] + \text{ArcTan}[x]\,\text{Log}\left[\frac{x^2}{1+x^2}\right] + i\,\text{PolyLog}\left[2,\,-1+\frac{2}{1-i\,x}\right]$$

Result (type 4, 182 leaves):

$$\frac{1}{4}\left(i\,\text{Log}[-i+x]^2 - i\,\text{Log}[i+x]^2 + 4\,\text{ArcTan}[x]\left(-2\,\text{Log}[x] + \text{Log}[-i+x] + \text{Log}[i+x] + \text{Log}\left[\frac{x^2}{1+x^2}\right]\right) - 2\,i\left(\text{Log}[-i+x]\,\text{Log}\left[-\frac{1}{2}\,i\,(i+x)\right] + \text{PolyLog}\left[2,\,\frac{1}{2}+\frac{i\,x}{2}\right]\right) - 4\,i\,(\text{Log}[1+i\,x]\,\text{Log}[x] + \text{PolyLog}[2,\,-i\,x]) + 4\,i\,(\text{Log}[1-i\,x]\,\text{Log}[x] + \text{PolyLog}[2,\,i\,x]) + 2\,i\left(\text{Log}\left[\frac{1}{2}\,(1+i\,x)\right]\,\text{Log}[i+x] + \text{PolyLog}\left[2,\,-\frac{1}{2}\,i\,(i+x)\right]\right)\right)$$

Problem 279: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[\frac{c x^2}{a+b x^2}\right]}{a+b x^2}\, dx$$

Optimal (type 4, 165 leaves, 5 steps):

$$\frac{i\, \text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right]^2}{\sqrt{a}\, \sqrt{b}}+\frac{\text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right] \text{Log}\left[\frac{c x^2}{a+b x^2}\right]}{\sqrt{a}\, \sqrt{b}}-\frac{2\, \text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right] \text{Log}\left[2-\frac{2 \sqrt{a}}{\sqrt{a}-i \sqrt{b}\, x}\right]}{\sqrt{a}\, \sqrt{b}}+\frac{i\, \text{PolyLog}\left[2,-1+\frac{2 \sqrt{a}}{\sqrt{a}-i \sqrt{b}\, x}\right]}{\sqrt{a}\, \sqrt{b}}$$

Result (type 4, 402 leaves):

$$\frac{1}{4 \sqrt{a}\, \sqrt{b}}\left(-8\, \text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right] \text{Log}[x]+4\, \text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right] \text{Log}\left[-\frac{i \sqrt{a}}{\sqrt{b}}+x\right]+i\, \text{Log}\left[-\frac{i \sqrt{a}}{\sqrt{b}}+x\right]^2+\right.$$
$$4\, \text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right] \text{Log}\left[\frac{i \sqrt{a}}{\sqrt{b}}+x\right]-i\, \text{Log}\left[\frac{i \sqrt{a}}{\sqrt{b}}+x\right]^2-2\, i\, \text{Log}\left[-\frac{i \sqrt{a}}{\sqrt{b}}+x\right] \text{Log}\left[\frac{1}{2}-\frac{i \sqrt{b}\, x}{2 \sqrt{a}}\right]+$$
$$2\, i\, \text{Log}\left[\frac{i \sqrt{a}}{\sqrt{b}}+x\right] \text{Log}\left[\frac{1}{2}+\frac{i \sqrt{b}\, x}{2 \sqrt{a}}\right]+4\, i\, \text{Log}[x]\, \text{Log}\left[1-\frac{i \sqrt{b}\, x}{\sqrt{a}}\right]-$$
$$4\, i\, \text{Log}[x]\, \text{Log}\left[1+\frac{i \sqrt{b}\, x}{\sqrt{a}}\right]+4\, \text{ArcTan}\left[\frac{\sqrt{b}\, x}{\sqrt{a}}\right] \text{Log}\left[\frac{c x^2}{a+b x^2}\right]-4\, i\, \text{PolyLog}\left[2,-\frac{i \sqrt{b}\, x}{\sqrt{a}}\right]+$$
$$\left.4\, i\, \text{PolyLog}\left[2,\frac{i \sqrt{b}\, x}{\sqrt{a}}\right]+2\, i\, \text{PolyLog}\left[2,\frac{1}{2}-\frac{i \sqrt{b}\, x}{2 \sqrt{a}}\right]-2\, i\, \text{PolyLog}\left[2,\frac{1}{2}+\frac{i \sqrt{b}\, x}{2 \sqrt{a}}\right]\right)$$

Problem 280: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[1+\frac{i \sqrt{1-a x}}{\sqrt{1+a x}}\right]}{1-a^2 x^2}\, dx$$

Optimal (type 4, 29 leaves, 1 step):

$$\frac{\text{PolyLog}\left[2,-\frac{i \sqrt{1-a x}}{\sqrt{1+a x}}\right]}{a}$$

Result (type 4, 134 leaves):

$$\frac{1}{4 a}\left(4\, \text{ArcTanh}[a x]\, \text{Log}\left[1+\frac{i \sqrt{1-a x}}{\sqrt{1+a x}}\right]+\text{PolyLog}\left[2,-e^{-2\, \text{ArcTanh}[a x]}\right]-\right.$$
$$2\left(\text{ArcTanh}[a x]\left(\text{Log}\left[1+e^{-2\, \text{ArcTanh}[a x]}\right]-\text{Log}\left[1-i\, e^{-\text{ArcTanh}[a x]}\right]+\text{Log}\left[1+i\, e^{-\text{ArcTanh}[a x]}\right]\right)-\right.$$
$$\left.\left.\text{PolyLog}\left[2,-i\, e^{-\text{ArcTanh}[a x]}\right]+\text{PolyLog}\left[2,i\, e^{-\text{ArcTanh}[a x]}\right]\right)\right)$$

Problem 281: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Log}\left[1-\frac{i \sqrt{1-a x}}{\sqrt{1+a x}}\right]}{1-a^2 x^2} \, dx$$

Optimal (type 4, 29 leaves, 1 step):

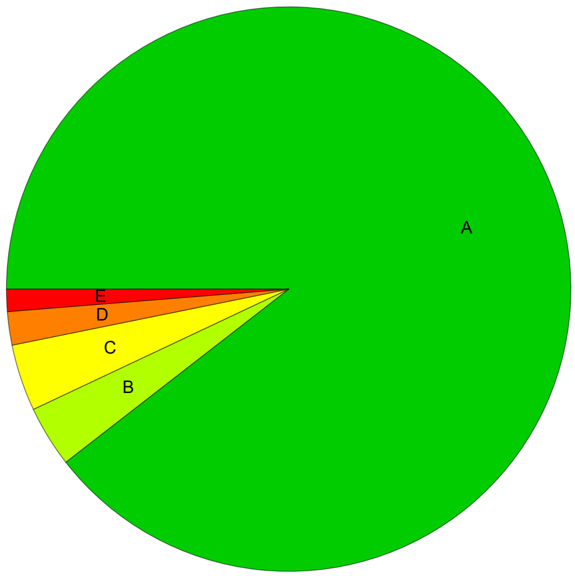
$$\frac{\text{PolyLog}\left[2,\frac{i \sqrt{1-a x}}{\sqrt{1+a x}}\right]}{a}$$

Result (type 4, 134 leaves):

$$\frac{1}{4 a}\left(4 \text{ArcTanh}[a x] \text{Log}\left[1-\frac{i \sqrt{1-a x}}{\sqrt{1+a x}}\right]+\text{PolyLog}\left[2,-e^{-2 \text{ArcTanh}[a x]}\right]-2 \left(\text{ArcTanh}[a x] \left(\text{Log}\left[1+e^{-2 \text{ArcTanh}[a x]}\right]+\text{Log}\left[1-i e^{-\text{ArcTanh}[a x]}\right]-\text{Log}\left[1+i e^{-\text{ArcTanh}[a x]}\right]\right)+\text{PolyLog}\left[2,-i e^{-\text{ArcTanh}[a x]}\right]-\text{PolyLog}\left[2,i e^{-\text{ArcTanh}[a x]}\right]\right)\right)$$

Summary of Integration Test Results

314 integration problems



A - 281 optimal antiderivatives

B - 11 more than twice size of optimal antiderivatives

C - 12 unnecessarily complex antiderivatives

D - 6 unable to integrate problems

E - 4 integration timeouts