Rubi 4.16.0.4 Integration Test Results

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

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

Problem 24: Result valid but suboptimal antiderivative.

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

Optimal (type 9, 5 leaves, ? steps):

$$f[x]\, g[x]$$

Result (type 9, 19 leaves, 1 step) :

$$\text{CannotIntegrate}[g[x]\, f'[x], x] + \text{CannotIntegrate}[f[x]\, g'[x], x]$$

Problem 43: Result valid but suboptimal antiderivative.

$$\int \left(\text{Cos}[x]\, g\left[e^x\right] f'[\text{Sin}[x]] + e^x f[\text{Sin}[x]]\, g'\left[e^x\right]\right) dx$$

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

$$f[\text{Sin}[x]]\, g\left[e^x\right]$$

Result (type 9, 30 leaves, 1 step) :

$$\text{CannotIntegrate}\left[\text{Cos}[x]\, g\left[e^x\right] f'[\text{Sin}[x]], x\right] + \text{CannotIntegrate}\left[e^x f[\text{Sin}[x]]\, g'\left[e^x\right], x\right]$$

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

Problem 40: Result optimal but 2 more steps used.

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

Optimal (type 4, 102 leaves, 5 steps) :

$$\frac{1}{3} x^3\, \text{Erf}\left[d\left(a + b\, \text{Log}\left[c\, x^n\right]\right)\right] - \frac{1}{3} e^{\frac{9-12 a b d^2 n}{4 b^2 d^2 n^2}} x^3 \left(c\, x^n\right)^{-3/n} \text{Erf}\left[\frac{2 a b d^2 - \frac{3}{n} + 2 b^2 d^2\, \text{Log}\left[c\, x^n\right]}{2 b d}\right]$$

Result (type 4, 102 leaves, 7 steps):

$$\frac{1}{3} x^3 \operatorname{Erf}\left[d \left(a + b \operatorname{Log}\left[c x^n\right]\right)\right] - \frac{1}{3} e^{\frac{9-12 a b d^2 n}{4 b^2 d^2 n^2}} x^3 \left(c x^n\right)^{-3/n} \operatorname{Erf}\left[\frac{2 a b d^2 - \frac{3}{n} + 2 b^2 d^2 \operatorname{Log}\left[c x^n\right]}{2 b d}\right]$$

Problem 41: Result optimal but 2 more steps used.

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

Optimal (type 4, 94 leaves, 5 steps):

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

Result (type 4, 94 leaves, 7 steps):

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

Problem 42: Result optimal but 2 more steps used.

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

Optimal (type 4, 93 leaves, 5 steps):

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

Result (type 4, 93 leaves, 7 steps):

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

Problem 44: Result optimal but 2 more steps used.

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

Optimal (type 4, 92 leaves, 5 steps):

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

Result (type 4, 92 leaves, 7 steps):

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

Problem 45: Result optimal but 2 more steps used.

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

Optimal (type 4, 95 leaves, 5 steps):

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

Result (type 4, 95 leaves, 7 steps):

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

Problem 46: Result optimal but 3 more steps used.

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

Optimal (type 4, 125 leaves, 5 steps):

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

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

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

Problem 143: Result optimal but 2 more steps used.

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

Optimal (type 4, 102 leaves, 5 steps):

$$\frac{1}{3}\,e^{\frac{9-12\,a\,b\,d^2\,n}{4\,b^2\,d^2\,n^2}}\,x^3\,(c\,x^n)^{-3/n}\,\text{Erf}\left[\frac{2\,a\,b\,d^2-\frac{3}{n}+2\,b^2\,d^2\,\text{Log}[c\,x^n]}{2\,b\,d}\right]+\frac{1}{3}\,x^3\,\text{Erfc}[d\,(a+b\,\text{Log}[c\,x^n])]$$

Result (type 4, 102 leaves, 7 steps):

$$\frac{1}{3}\,e^{\frac{9-12\,a\,b\,d^2\,n}{4\,b^2\,d^2\,n^2}}\,x^3\,(c\,x^n)^{-3/n}\,\text{Erf}\left[\frac{2\,a\,b\,d^2-\frac{3}{n}+2\,b^2\,d^2\,\text{Log}[c\,x^n]}{2\,b\,d}\right]+\frac{1}{3}\,x^3\,\text{Erfc}[d\,(a+b\,\text{Log}[c\,x^n])]$$

Problem 144: Result optimal but 2 more steps used.

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

Optimal (type 4, 94 leaves, 5 steps):

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

Result (type 4, 94 leaves, 7 steps):

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

Problem 145: Result optimal but 2 more steps used.

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

Optimal (type 4, 92 leaves, 5 steps):

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

Result (type 4, 92 leaves, 7 steps):

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

Problem 147: Result optimal but 2 more steps used.

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

Optimal (type 4, 93 leaves, 5 steps):

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

Result (type 4, 93 leaves, 7 steps):

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

Problem 148: Result optimal but 2 more steps used.

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

Optimal (type 4, 95 leaves, 5 steps):

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

Result (type 4, 95 leaves, 7 steps):

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

Problem 149: Result optimal but 3 more steps used.

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

Optimal (type 4, 126 leaves, 5 steps):

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

Result (type 4, 126 leaves, 8 steps):

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

Problem 246: Result optimal but 2 more steps used.

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

Optimal (type 4, 102 leaves, 5 steps):

$$\frac{1}{3} x^3 \text{Erfi}\left[d \left(a+b \text{Log}\left[c x^n\right]\right)\right]-\frac{1}{3} e^{-\frac{3 \left(3+4 a b d^2 n\right)}{4 b^2 d^2 n^2}} x^3 \left(c x^n\right)^{-3/n} \text{Erfi}\left[\frac{2 a b d^2+\frac{3}{n}+2 b^2 d^2 \text{Log}\left[c x^n\right]}{2 b d}\right]$$

Result (type 4, 102 leaves, 7 steps):

$$\frac{1}{3} x^3 \text{Erfi}\left[d \left(a+b \text{Log}\left[c x^n\right]\right)\right]-\frac{1}{3} e^{-\frac{3 \left(3+4 a b d^2 n\right)}{4 b^2 d^2 n^2}} x^3 \left(c x^n\right)^{-3/n} \text{Erfi}\left[\frac{2 a b d^2+\frac{3}{n}+2 b^2 d^2 \text{Log}\left[c x^n\right]}{2 b d}\right]$$

Problem 247: Result optimal but 2 more steps used.

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

Optimal (type 4, 93 leaves, 5 steps):

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

Result (type 4, 93 leaves, 7 steps):

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

Problem 248: Result optimal but 2 more steps used.

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

Optimal (type 4, 91 leaves, 5 steps):

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

Result (type 4, 91 leaves, 7 steps):

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

Problem 250: Result optimal but 2 more steps used.

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

Optimal (type 4, 94 leaves, 5 steps):

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

Result (type 4, 94 leaves, 7 steps):

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

Problem 251: Result optimal but 2 more steps used.

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

Optimal (type 4, 95 leaves, 5 steps):

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

Result (type 4, 95 leaves, 7 steps):

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

Problem 252: Result optimal but 3 more steps used.

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

Optimal (type 4, 126 leaves, 5 steps):

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

Result (type 4, 126 leaves, 8 steps):

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

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

Problem 54: Result optimal but 4 more steps used.

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

Optimal (type 4, 231 leaves, 10 steps):

$$\left(\frac{1}{12}-\frac{i}{12}\right)\,e^{-\frac{3\,a}{b\,n}+\frac{9\,i}{2\,b^2\,d^2\,n^2\,\pi}}\,x^3\,\left(c\,x^n\right)^{-3/n}\,\text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\,\left(\frac{3}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\left(\frac{1}{12}-\frac{i}{12}\right)\,e^{-\frac{3\,a}{b\,n}-\frac{9\,i}{2\,b^2\,d^2\,n^2\,\pi}}\,x^3\,\left(c\,x^n\right)^{-3/n}\,\text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\,\left(\frac{3}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\frac{1}{3}\,x^3\,\text{FresnelS}\left[d\,\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]$$

Result (type 4, 231 leaves, 14 steps):

$$\left(\frac{1}{12}-\frac{i}{12}\right)\,e^{-\frac{3\,a}{b\,n}+\frac{9\,i}{2\,b^2\,d^2\,n^2\,\pi}}\,x^3\,\left(c\,x^n\right)^{-3/n}\,\text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\,\left(\frac{3}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\left(\frac{1}{12}-\frac{i}{12}\right)\,e^{-\frac{3\,a}{b\,n}-\frac{9\,i}{2\,b^2\,d^2\,n^2\,\pi}}\,x^3\,\left(c\,x^n\right)^{-3/n}\,\text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\,\left(\frac{3}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\frac{1}{3}\,x^3\,\text{FresnelS}\left[d\,\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]$$

Problem 55: Result optimal but 4 more steps used.

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

Optimal (type 4, 227 leaves, 10 steps):

$$\left(\frac{1}{8}-\frac{\mathrm{i}}{8}\right) e^{\frac{2\,\mathrm{i}-2\,a\,b\,d^2\,n\,\pi}{b^2\,d^2\,n^2\,\pi}}\,x^2\,\left(c\,x^n\right)^{-2/n}\,\mathrm{Erf}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{2}{n}+\mathrm{i}\,a\,b\,d^2\,\pi+\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\left(\frac{1}{8}-\frac{\mathrm{i}}{8}\right) e^{-\frac{2\,(\mathrm{i}+a\,b\,d^2\,n\,\pi)}{b^2\,d^2\,n^2\,\pi}}\,x^2\,\left(c\,x^n\right)^{-2/n}\,\mathrm{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{2}{n}-\mathrm{i}\,a\,b\,d^2\,\pi-\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\frac{1}{2}\,x^2\,\mathrm{FresnelS}\left[d\,\left(a+b\,\mathrm{Log}[c\,x^n]\right)\right]$$

Result (type 4, 227 leaves, 14 steps):

$$\left(\frac{1}{8}-\frac{\mathrm{i}}{8}\right) e^{\frac{2\,\mathrm{i}-2\,a\,b\,d^2\,n\,\pi}{b^2\,d^2\,n^2\,\pi}}\,x^2\,\left(c\,x^n\right)^{-2/n}\,\mathrm{Erf}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{2}{n}+\mathrm{i}\,a\,b\,d^2\,\pi+\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\left(\frac{1}{8}-\frac{\mathrm{i}}{8}\right) e^{-\frac{2\,(\mathrm{i}+a\,b\,d^2\,n\,\pi)}{b^2\,d^2\,n^2\,\pi}}\,x^2\,\left(c\,x^n\right)^{-2/n}\,\mathrm{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{2}{n}-\mathrm{i}\,a\,b\,d^2\,\pi-\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\frac{1}{2}\,x^2\,\mathrm{FresnelS}\left[d\,\left(a+b\,\mathrm{Log}[c\,x^n]\right)\right]$$

Problem 56: Result optimal but 4 more steps used.

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

Optimal (type 4, 214 leaves, 10 steps):

$$\left(\frac{1}{4}-\frac{\mathrm{i}}{4}\right) e^{-\frac{2\,a\,b\,n-\frac{\mathrm{i}}{d^2\,\pi}}{2\,b^2\,n^2}}\,x\,\left(c\,x^n\right)^{-1/n}\,\mathrm{Erf}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{1}{n}+\mathrm{i}\,a\,b\,d^2\,\pi+\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\left(\frac{1}{4}-\frac{\mathrm{i}}{4}\right) e^{-\frac{2\,a\,b\,n+\frac{\mathrm{i}}{d^2\,\pi}}{2\,b^2\,n^2}}\,x\,\left(c\,x^n\right)^{-1/n}\,\mathrm{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{1}{n}-\mathrm{i}\,a\,b\,d^2\,\pi-\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$x\,\mathrm{FresnelS}\left[d\,\left(a+b\,\mathrm{Log}[c\,x^n]\right)\right]$$

Result (type 4, 214 leaves, 14 steps):

$$\left(\frac{1}{4}-\frac{\mathrm{i}}{4}\right) e^{-\frac{2\,a\,b\,n-\frac{\mathrm{i}}{d^2\,\pi}}{2\,b^2\,n^2}}\,x\,\left(c\,x^n\right)^{-1/n}\,\mathrm{Erf}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{1}{n}+\mathrm{i}\,a\,b\,d^2\,\pi+\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$\left(\frac{1}{4}-\frac{\mathrm{i}}{4}\right) e^{-\frac{2\,a\,b\,n+\frac{\mathrm{i}}{d^2\,\pi}}{2\,b^2\,n^2}}\,x\,\left(c\,x^n\right)^{-1/n}\,\mathrm{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{\mathrm{i}}{2}\right)\left(\frac{1}{n}-\mathrm{i}\,a\,b\,d^2\,\pi-\mathrm{i}\,b^2\,d^2\,\pi\,\mathrm{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+$$
$$x\,\mathrm{FresnelS}\left[d\,\left(a+b\,\mathrm{Log}[c\,x^n]\right)\right]$$

Problem 58: Result optimal but 4 more steps used.

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

Optimal (type 4, 217 leaves, 10 steps):

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

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

Result (type 4, 217 leaves, 14 steps):

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

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

Problem 59: Result optimal but 4 more steps used.

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

Optimal (type 4, 228 leaves, 10 steps):

$$\frac{\left(\frac{1}{8}-\frac{i}{8}\right) e^{\frac{2 i+2 a b d^2 n \pi}{b^2 d^2 n^2 \pi}} \left(c x^n\right)^{2/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right) \left(\frac{2}{n}-i a b d^2 \pi-i b^2 d^2 \pi \text{Log}\left[c x^n\right]\right)}{b d \sqrt{\pi}}\right]}{x^2}+$$

$$\frac{\left(\frac{1}{8}-\frac{i}{8}\right) e^{-\frac{2 \left(i-a b d^2 n \pi\right)}{b^2 d^2 n^2 \pi}} \left(c x^n\right)^{2/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right) \left(\frac{2}{n}+i a b d^2 \pi+i b^2 d^2 \pi \text{Log}\left[c x^n\right]\right)}{b d \sqrt{\pi}}\right]}{x^2}-\frac{\text{FresnelS}\left[d \left(a+b \text{Log}\left[c x^n\right]\right)\right]}{2 x^2}$$

Result (type 4, 228 leaves, 14 steps):

$$\frac{\left(\frac{1}{8}-\frac{i}{8}\right) e^{\frac{2 i+2 a b d^2 n \pi}{b^2 d^2 n^2 \pi}} \left(c x^n\right)^{2/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right) \left(\frac{2}{n}-i a b d^2 \pi-i b^2 d^2 \pi \text{Log}\left[c x^n\right]\right)}{b d \sqrt{\pi}}\right]}{x^2}+$$

$$\frac{\left(\frac{1}{8}-\frac{i}{8}\right) e^{-\frac{2 \left(i-a b d^2 n \pi\right)}{b^2 d^2 n^2 \pi}} \left(c x^n\right)^{2/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right) \left(\frac{2}{n}+i a b d^2 \pi+i b^2 d^2 \pi \text{Log}\left[c x^n\right]\right)}{b d \sqrt{\pi}}\right]}{x^2}-\frac{\text{FresnelS}\left[d \left(a+b \text{Log}\left[c x^n\right]\right)\right]}{2 x^2}$$

Problem 60: Result optimal but 6 more steps used.

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

Optimal (type 4, 280 leaves, 10 steps):

$$\frac{1}{1+m}\left(\frac{1}{4}-\frac{i}{4}\right) e^{\frac{i(1+m)(1+m+2 i a b d^2 n \pi)}{2 b^2 d^2 n^2 \pi}} x (e x)^m \left(c x^n\right)^{-\frac{1+m}{n}} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m+i a b d^2 n \pi+i b^2 d^2 n \pi \text{Log}[c x^n]\right)}{b d n \sqrt{\pi}}\right]+\frac{1}{1+m}\left(\frac{1}{4}-\frac{i}{4}\right) e^{-\frac{i(1+m)(1+m-2 i a b d^2 n \pi)}{2 b^2 d^2 n^2 \pi}} x (e x)^m \left(c x^n\right)^{-\frac{1+m}{n}} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m-i a b d^2 n \pi-i b^2 d^2 n \pi \text{Log}[c x^n]\right)}{b d n \sqrt{\pi}}\right]+\frac{(e x)^{1+m} \text{FresnelS}\left[d\left(a+b \text{Log}[c x^n]\right)\right]}{e(1+m)}$$

Result (type 4, 280 leaves, 16 steps):

$$\frac{1}{1+m}\left(\frac{1}{4}-\frac{i}{4}\right) e^{\frac{i(1+m)(1+m+2 i a b d^2 n \pi)}{2 b^2 d^2 n^2 \pi}} x (e x)^m \left(c x^n\right)^{-\frac{1+m}{n}} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m+i a b d^2 n \pi+i b^2 d^2 n \pi \text{Log}[c x^n]\right)}{b d n \sqrt{\pi}}\right]+\frac{1}{1+m}\left(\frac{1}{4}-\frac{i}{4}\right) e^{-\frac{i(1+m)(1+m-2 i a b d^2 n \pi)}{2 b^2 d^2 n^2 \pi}} x (e x)^m \left(c x^n\right)^{-\frac{1+m}{n}} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m-i a b d^2 n \pi-i b^2 d^2 n \pi \text{Log}[c x^n]\right)}{b d n \sqrt{\pi}}\right]+\frac{(e x)^{1+m} \text{FresnelS}\left[d\left(a+b \text{Log}[c x^n]\right)\right]}{e(1+m)}$$

Problem 163: Result optimal but 4 more steps used.

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

Optimal (type 4, 231 leaves, 10 steps):

$$\left(\frac{1}{12}+\frac{i}{12}\right) e^{-\frac{3 a}{b n}+\frac{9 i}{2 b^2 d^2 n^2 \pi}} x^3 \left(c x^n\right)^{-3/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{3}{n}+i a b d^2 \pi+i b^2 d^2 \pi \text{Log}[c x^n]\right)}{b d \sqrt{\pi}}\right]-\left(\frac{1}{12}+\frac{i}{12}\right) e^{-\frac{3 a}{b n}-\frac{9 i}{2 b^2 d^2 n^2 \pi}} x^3 \left(c x^n\right)^{-3/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{3}{n}-i a b d^2 \pi-i b^2 d^2 \pi \text{Log}[c x^n]\right)}{b d \sqrt{\pi}}\right]+\frac{1}{3} x^3 \text{FresnelC}\left[d\left(a+b \text{Log}[c x^n]\right)\right]$$

Result (type 4, 231 leaves, 14 steps):

$$\left(\frac{1}{12}+\frac{i}{12}\right) e^{-\frac{3 a}{b n}+\frac{9 i}{2 b^2 d^2 n^2 \pi}} x^3 \left(c x^n\right)^{-3/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{3}{n}+i a b d^2 \pi+i b^2 d^2 \pi \text{Log}[c x^n]\right)}{b d \sqrt{\pi}}\right]-\left(\frac{1}{12}+\frac{i}{12}\right) e^{-\frac{3 a}{b n}-\frac{9 i}{2 b^2 d^2 n^2 \pi}} x^3 \left(c x^n\right)^{-3/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{3}{n}-i a b d^2 \pi-i b^2 d^2 \pi \text{Log}[c x^n]\right)}{b d \sqrt{\pi}}\right]+\frac{1}{3} x^3 \text{FresnelC}\left[d\left(a+b \text{Log}[c x^n]\right)\right]$$

Problem 164: Result optimal but 4 more steps used.

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

Optimal (type 4, 227 leaves, 10 steps):

$$\left(\frac{1}{8}+\frac{i}{8}\right) e^{\frac{2 i-2 a b d^2 n \pi}{b^2 d^2 n^2 \pi}} x^2 \left(c\,x^n\right)^{-2/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]-\left(\frac{1}{8}+\frac{i}{8}\right) e^{-\frac{2\left(i+a b d^2 n \pi\right)}{b^2 d^2 n^2 \pi}} x^2 \left(c\,x^n\right)^{-2/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+\frac{1}{2} x^2\,\text{FresnelC}[d\,(a+b\,\text{Log}[c\,x^n])]$$

Result (type 4, 227 leaves, 14 steps):

$$\left(\frac{1}{8}+\frac{i}{8}\right) e^{\frac{2 i-2 a b d^2 n \pi}{b^2 d^2 n^2 \pi}} x^2 \left(c\,x^n\right)^{-2/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]-\left(\frac{1}{8}+\frac{i}{8}\right) e^{-\frac{2\left(i+a b d^2 n \pi\right)}{b^2 d^2 n^2 \pi}} x^2 \left(c\,x^n\right)^{-2/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+\frac{1}{2} x^2\,\text{FresnelC}[d\,(a+b\,\text{Log}[c\,x^n])]$$

Problem 165: Result optimal but 4 more steps used.

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

Optimal (type 4, 214 leaves, 10 steps):

$$\left(\frac{1}{4}+\frac{i}{4}\right) e^{-\frac{2 a b n-\frac{i}{d^2 \pi}}{2 b^2 n^2}} x \left(c\,x^n\right)^{-1/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]-\left(\frac{1}{4}+\frac{i}{4}\right) e^{-\frac{2 a b n+\frac{i}{d^2 \pi}}{2 b^2 n^2}} x \left(c\,x^n\right)^{-1/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+x\,\text{FresnelC}[d\,(a+b\,\text{Log}[c\,x^n])]$$

Result (type 4, 214 leaves, 14 steps):

$$\left(\frac{1}{4}+\frac{i}{4}\right) e^{-\frac{2 a b n-\frac{i}{d^2 \pi}}{2 b^2 n^2}} x \left(c\,x^n\right)^{-1/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]-\left(\frac{1}{4}+\frac{i}{4}\right) e^{-\frac{2 a b n+\frac{i}{d^2 \pi}}{2 b^2 n^2}} x \left(c\,x^n\right)^{-1/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}[c\,x^n]\right)}{b\,d\,\sqrt{\pi}}\right]+x\,\text{FresnelC}[d\,(a+b\,\text{Log}[c\,x^n])]$$

Problem 167: Result optimal but 4 more steps used.

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

Optimal (type 4, 217 leaves, 10 steps):

$$\frac{\left(\frac{1}{4}+\frac{i}{4}\right) e^{\frac{2 a b n+\frac{i}{d^2 \pi}}{2 b^2 n^2}} \left(c\,x^n\right)^{\frac{1}{n}} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x}-\frac{\left(\frac{1}{4}+\frac{i}{4}\right) e^{\frac{2 a b n-\frac{i}{d^2 \pi}}{2 b^2 n^2}} \left(c\,x^n\right)^{\frac{1}{n}} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x}-\frac{\text{FresnelC}\left[d\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]}{x}$$

Result (type 4, 217 leaves, 14 steps):

$$\frac{\left(\frac{1}{4}+\frac{i}{4}\right) e^{\frac{2 a b n+\frac{i}{d^2 \pi}}{2 b^2 n^2}} \left(c\,x^n\right)^{\frac{1}{n}} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x}-\frac{\left(\frac{1}{4}+\frac{i}{4}\right) e^{\frac{2 a b n-\frac{i}{d^2 \pi}}{2 b^2 n^2}} \left(c\,x^n\right)^{\frac{1}{n}} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{1}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x}-\frac{\text{FresnelC}\left[d\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]}{x}$$

Problem 168: Result optimal but 4 more steps used.

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

Optimal (type 4, 228 leaves, 10 steps):

$$\frac{\left(\frac{1}{8}+\frac{i}{8}\right) e^{\frac{2 i+2 a b d^2 n \pi}{b^2 d^2 n^2 \pi}} \left(c\,x^n\right)^{2/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x^2}-\frac{\left(\frac{1}{8}+\frac{i}{8}\right) e^{-\frac{2\left(i-a b d^2 n \pi\right)}{b^2 d^2 n^2 \pi}} \left(c\,x^n\right)^{2/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x^2}-\frac{\text{FresnelC}\left[d\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]}{2\,x^2}$$

Result (type 4, 228 leaves, 14 steps):

$$\frac{\left(\frac{1}{8}+\frac{i}{8}\right) e^{\frac{2 i+2 a b d^2 n \pi}{b^2 d^2 n^2 \pi}} \left(c\,x^n\right)^{2/n} \text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}-i\,a\,b\,d^2\,\pi-i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x^2}-\frac{\left(\frac{1}{8}+\frac{i}{8}\right) e^{-\frac{2\left(i-a b d^2 n \pi\right)}{b^2 d^2 n^2 \pi}} \left(c\,x^n\right)^{2/n} \text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(\frac{2}{n}+i\,a\,b\,d^2\,\pi+i\,b^2\,d^2\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,\sqrt{\pi}}\right]}{x^2}-\frac{\text{FresnelC}\left[d\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]}{2\,x^2}$$

Problem 169: Result optimal but 6 more steps used.

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

Optimal (type 4, 280 leaves, 10 steps):

$$\frac{1}{1+m}\left(\frac{1}{4}+\frac{i}{4}\right)e^{\frac{i\,(1+m)\,(1+m+2\,i\,a\,b\,d^2\,n\,\pi)}{2\,b^2\,d^2\,n^2\,\pi}}\,x\,(e\,x)^m\left(c\,x^n\right)^{-\frac{1+m}{n}}\,\text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m+i\,a\,b\,d^2\,n\,\pi+i\,b^2\,d^2\,n\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,n\,\sqrt{\pi}}\right]-\frac{1}{1+m}\left(\frac{1}{4}+\frac{i}{4}\right)e^{-\frac{i\,(1+m)\,(1+m-2\,i\,a\,b\,d^2\,n\,\pi)}{2\,b^2\,d^2\,n^2\,\pi}}\,x\,(e\,x)^m\left(c\,x^n\right)^{-\frac{1+m}{n}}\,\text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m-i\,a\,b\,d^2\,n\,\pi-i\,b^2\,d^2\,n\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,n\,\sqrt{\pi}}\right]+\frac{(e\,x)^{1+m}\,\text{FresnelC}\left[d\,\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]}{e\,(1+m)}$$

Result (type 4, 280 leaves, 16 steps):

$$\frac{1}{1+m}\left(\frac{1}{4}+\frac{i}{4}\right)e^{\frac{i\,(1+m)\,(1+m+2\,i\,a\,b\,d^2\,n\,\pi)}{2\,b^2\,d^2\,n^2\,\pi}}\,x\,(e\,x)^m\left(c\,x^n\right)^{-\frac{1+m}{n}}\,\text{Erf}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m+i\,a\,b\,d^2\,n\,\pi+i\,b^2\,d^2\,n\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,n\,\sqrt{\pi}}\right]-\frac{1}{1+m}\left(\frac{1}{4}+\frac{i}{4}\right)e^{-\frac{i\,(1+m)\,(1+m-2\,i\,a\,b\,d^2\,n\,\pi)}{2\,b^2\,d^2\,n^2\,\pi}}\,x\,(e\,x)^m\left(c\,x^n\right)^{-\frac{1+m}{n}}\,\text{Erfi}\left[\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+m-i\,a\,b\,d^2\,n\,\pi-i\,b^2\,d^2\,n\,\pi\,\text{Log}\left[c\,x^n\right]\right)}{b\,d\,n\,\sqrt{\pi}}\right]+\frac{(e\,x)^{1+m}\,\text{FresnelC}\left[d\,\left(a+b\,\text{Log}\left[c\,x^n\right]\right)\right]}{e\,(1+m)}$$

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

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

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

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

Test results for the 14 problems in "8.7 Zeta function.m"

Test results for the 198 problems in "8.8 Polylogarithm function.m"

Problem 170: Result valid but suboptimal antiderivative.

$$\int x^2 \left(g + h\,\text{Log}[1 - c\,x]\right) \text{PolyLog}[2, c\,x]\, dx$$

Optimal (type 4, 423 leaves, 25 steps):

$$\frac{121\,h\,x}{108\,c^2} + \frac{13\,h\,x^2}{216\,c} + \frac{h\,x^3}{81} + \frac{h\,(1 - c\,x)^2}{6\,c^3} - \frac{2\,h\,(1 - c\,x)^3}{81\,c^3} + \frac{13\,h\,\text{Log}[1 - c\,x]}{108\,c^3} - \frac{h\,x^2\,\text{Log}[1 - c\,x]}{12\,c} - \frac{1}{27}\,h\,x^3\,\text{Log}[1 - c\,x] + \frac{h\,(1 - c\,x)\,\text{Log}[1 - c\,x]}{3\,c^3} + \frac{h\,\text{Log}[1 - c\,x]^2}{9\,c^3} - \frac{h\,\text{Log}[c\,x]\,\text{Log}[1 - c\,x]^2}{3\,c^3} + \frac{1}{9}\,x^3\,\text{Log}[1 - c\,x]\,\left(g + h\,\text{Log}[1 - c\,x]\right) + \frac{(1 - c\,x)\,\left(g + 2\,h\,\text{Log}[1 - c\,x]\right)}{3\,c^3} - \frac{(1 - c\,x)^2\,\left(g + 2\,h\,\text{Log}[1 - c\,x]\right)}{6\,c^3} + \frac{(1 - c\,x)^3\,\left(g + 2\,h\,\text{Log}[1 - c\,x]\right)}{27\,c^3} - \frac{\text{Log}[1 - c\,x]\,\left(g + 2\,h\,\text{Log}[1 - c\,x]\right)}{9\,c^3} - \frac{h\,x\,\text{PolyLog}[2, c\,x]}{3\,c^2} - \frac{h\,x^2\,\text{PolyLog}[2, c\,x]}{6\,c} - \frac{1}{9}\,h\,x^3\,\text{PolyLog}[2, c\,x] - \frac{h\,\text{Log}[1 - c\,x]\,\text{PolyLog}[2, c\,x]}{3\,c^3} + \frac{1}{3}\,x^3\,\left(g + h\,\text{Log}[1 - c\,x]\right)\,\text{PolyLog}[2, c\,x] - \frac{2\,h\,\text{Log}[1 - c\,x]\,\text{PolyLog}[2, 1 - c\,x]}{3\,c^3} + \frac{2\,h\,\text{PolyLog}[3, 1 - c\,x]}{3\,c^3}$$

Result (type 4, 366 leaves, 37 steps):

$$\frac{107\,h\,x}{108\,c^2}+\frac{23\,h\,x^2}{216\,c}+\frac{2\,h\,x^3}{81}+\frac{h\,(1-c\,x)^2}{12\,c^3}-\frac{h\,(1-c\,x)^3}{81\,c^3}+\frac{23\,h\,\text{Log}[1-c\,x]}{108\,c^3}-\frac{5\,h\,x^2\,\text{Log}[1-c\,x]}{36\,c}-\frac{2}{27}\,h\,x^3\,\text{Log}[1-c\,x]+\frac{4\,h\,(1-c\,x)\,\text{Log}[1-c\,x]}{9\,c^3}-\frac{h\,\text{Log}[c\,x]\,\text{Log}[1-c\,x]^2}{3\,c^3}+\frac{1}{9}\,x^3\,\text{Log}[1-c\,x]\,(g+h\,\text{Log}[1-c\,x])+\frac{1}{54}\left(\frac{18\,(1-c\,x)}{c^3}-\frac{9\,(1-c\,x)^2}{c^3}+\frac{2\,(1-c\,x)^3}{c^3}-\frac{6\,\text{Log}[1-c\,x]}{c^3}\right)(g+h\,\text{Log}[1-c\,x])-\frac{h\,x\,\text{PolyLog}[2,\,c\,x]}{3\,c^2}-\frac{h\,x^2\,\text{PolyLog}[2,\,c\,x]}{6\,c}-\frac{1}{9}\,h\,x^3\,\text{PolyLog}[2,\,c\,x]-\frac{h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,c\,x]}{3\,c^3}+\frac{1}{3}\,x^3\,(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]-\frac{2\,h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,1-c\,x]}{3\,c^3}+\frac{2\,h\,\text{PolyLog}[3,\,1-c\,x]}{3\,c^3}$$

Problem 171: Result valid but suboptimal antiderivative.

$$\int x\,(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]\,dx$$

Optimal (type 4, 330 leaves, 21 steps) :

$$\frac{13\,h\,x}{8\,c}+\frac{h\,x^2}{16}+\frac{h\,(1-c\,x)^2}{8\,c^2}+\frac{h\,\text{Log}[1-c\,x]}{8\,c^2}-\frac{1}{8}\,h\,x^2\,\text{Log}[1-c\,x]+\frac{h\,(1-c\,x)\,\text{Log}[1-c\,x]}{2\,c^2}+\frac{h\,\text{Log}[1-c\,x]^2}{4\,c^2}-\frac{h\,\text{Log}[c\,x]\,\text{Log}[1-c\,x]^2}{2\,c^2}+\frac{1}{4}\,x^2\,\text{Log}[1-c\,x]\,(g+h\,\text{Log}[1-c\,x])+\frac{(1-c\,x)\,(g+2\,h\,\text{Log}[1-c\,x])}{2\,c^2}-\frac{(1-c\,x)^2\,(g+2\,h\,\text{Log}[1-c\,x])}{8\,c^2}-\frac{\text{Log}[1-c\,x]\,(g+2\,h\,\text{Log}[1-c\,x])}{4\,c^2}-\frac{h\,x\,\text{PolyLog}[2,\,c\,x]}{2\,c}-\frac{1}{4}\,h\,x^2\,\text{PolyLog}[2,\,c\,x]-\frac{h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,c\,x]}{2\,c^2}+\frac{1}{2}\,x^2\,(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]-\frac{h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,1-c\,x]}{c^2}+\frac{h\,\text{PolyLog}[3,\,1-c\,x]}{c^2}$$

Result (type 4, 287 leaves, 30 steps) :

$$\frac{3\,h\,x}{2\,c}+\frac{h\,x^2}{8}+\frac{h\,(1-c\,x)^2}{16\,c^2}+\frac{h\,\text{Log}[1-c\,x]}{4\,c^2}-\frac{1}{4}\,h\,x^2\,\text{Log}[1-c\,x]+$$
$$\frac{3\,h\,(1-c\,x)\,\text{Log}[1-c\,x]}{4\,c^2}-\frac{h\,\text{Log}[c\,x]\,\text{Log}[1-c\,x]^2}{2\,c^2}+\frac{1}{4}\,x^2\,\text{Log}[1-c\,x]\,(g+h\,\text{Log}[1-c\,x])+$$
$$\frac{1}{8}\left(\frac{4\,(1-c\,x)}{c^2}-\frac{(1-c\,x)^2}{c^2}-\frac{2\,\text{Log}[1-c\,x]}{c^2}\right)(g+h\,\text{Log}[1-c\,x])-$$
$$\frac{h\,x\,\text{PolyLog}[2,\,c\,x]}{2\,c}-\frac{1}{4}\,h\,x^2\,\text{PolyLog}[2,\,c\,x]-\frac{h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,c\,x]}{2\,c^2}+$$
$$\frac{1}{2}\,x^2\,(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]-\frac{h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,1-c\,x]}{c^2}+\frac{h\,\text{PolyLog}[3,\,1-c\,x]}{c^2}$$

Problem 174: Result valid but suboptimal antiderivative.

$$\int\frac{(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]}{x^2}\,dx$$

Optimal (type 4, 156 leaves, 12 steps):

$$c\,h\,\text{Log}[c\,x]\,\text{Log}[1-c\,x]^2+\frac{\text{Log}[1-c\,x]\,(g+h\,\text{Log}[1-c\,x])}{x}+$$
$$c\,(g+2\,h\,\text{Log}[1-c\,x])\,\text{Log}\left[1-\frac{1}{1-c\,x}\right]+c\,h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,c\,x]-$$
$$\frac{(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]}{x}-2\,c\,h\,\text{PolyLog}\left[2,\,\frac{1}{1-c\,x}\right]+$$
$$2\,c\,h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,1-c\,x]-c\,h\,\text{PolyLog}[3,\,c\,x]-2\,c\,h\,\text{PolyLog}[3,\,1-c\,x]$$

Result (type 4, 165 leaves, 19 steps):

$$c\,g\,\text{Log}[x]-\frac{1}{2}\,c\,h\,\text{Log}[1-c\,x]^2+c\,h\,\text{Log}[c\,x]\,\text{Log}[1-c\,x]^2+$$
$$\frac{\text{Log}[1-c\,x]\,(g+h\,\text{Log}[1-c\,x])}{x}-\frac{c\,(g+h\,\text{Log}[1-c\,x])^2}{2\,h}-2\,c\,h\,\text{PolyLog}[2,\,c\,x]+$$
$$c\,h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,c\,x]-\frac{(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]}{x}+$$
$$2\,c\,h\,\text{Log}[1-c\,x]\,\text{PolyLog}[2,\,1-c\,x]-c\,h\,\text{PolyLog}[3,\,c\,x]-2\,c\,h\,\text{PolyLog}[3,\,1-c\,x]$$

Problem 175: Result valid but suboptimal antiderivative.

$$\int\frac{(g+h\,\text{Log}[1-c\,x])\,\text{PolyLog}[2,\,c\,x]}{x^3}\,dx$$

Optimal (type 4, 266 leaves, 20 steps):

$$-c^2 h \operatorname{Log}[x]+\frac{1}{2} c^2 h \operatorname{Log}[1-c x]-\frac{c h \operatorname{Log}[1-c x]}{2 x}+\frac{1}{2} c^2 h \operatorname{Log}[c x] \operatorname{Log}[1-c x]^2+\frac{\operatorname{Log}[1-c x]\,(g+h \operatorname{Log}[1-c x])}{4 x^2}-\frac{c\,(1-c x)\,(g+2 h \operatorname{Log}[1-c x])}{4 x}+\frac{1}{4} c^2\,(g+2 h \operatorname{Log}[1-c x]) \operatorname{Log}\left[1-\frac{1}{1-c x}\right]+\frac{c h \operatorname{PolyLog}[2, c x]}{2 x}+\frac{1}{2} c^2 h \operatorname{Log}[1-c x] \operatorname{PolyLog}[2, c x]-\frac{(g+h \operatorname{Log}[1-c x]) \operatorname{PolyLog}[2, c x]}{2 x^2}-\frac{1}{2} c^2 h \operatorname{PolyLog}\left[2, \frac{1}{1-c x}\right]+c^2 h \operatorname{Log}[1-c x] \operatorname{PolyLog}[2,1-c x]-\frac{1}{2} c^2 h \operatorname{PolyLog}[3, c x]-c^2 h \operatorname{PolyLog}[3,1-c x]$$

Result (type 4, 278 leaves, 31 steps):

$$\frac{1}{4} c^2 g \operatorname{Log}[x]-c^2 h \operatorname{Log}[x]+\frac{3}{4} c^2 h \operatorname{Log}[1-c x]-\frac{3 c h \operatorname{Log}[1-c x]}{4 x}-\frac{1}{8} c^2 h \operatorname{Log}[1-c x]^2+\frac{1}{2} c^2 h \operatorname{Log}[c x] \operatorname{Log}[1-c x]^2-\frac{c\,(1-c x)\,(g+h \operatorname{Log}[1-c x])}{4 x}+\frac{\operatorname{Log}[1-c x]\,(g+h \operatorname{Log}[1-c x])}{4 x^2}-\frac{c^2\,(g+h \operatorname{Log}[1-c x])^2}{8 h}-\frac{1}{2} c^2 h \operatorname{PolyLog}[2, c x]+\frac{c h \operatorname{PolyLog}[2, c x]}{2 x}+\frac{1}{2} c^2 h \operatorname{Log}[1-c x] \operatorname{PolyLog}[2, c x]-\frac{(g+h \operatorname{Log}[1-c x]) \operatorname{PolyLog}[2, c x]}{2 x^2}+c^2 h \operatorname{Log}[1-c x] \operatorname{PolyLog}[2,1-c x]-\frac{1}{2} c^2 h \operatorname{PolyLog}[3, c x]-c^2 h \operatorname{PolyLog}[3,1-c x]$$

Problem 176: Result valid but suboptimal antiderivative.

$$\int \frac{(g+h \operatorname{Log}[1-c x]) \operatorname{PolyLog}[2, c x]}{x^4}\, dx$$

Optimal (type 4, 340 leaves, 28 steps):

$$\frac{7 c^2 h}{36 x}-\frac{3}{4} c^3 h \operatorname{Log}[x]+\frac{19}{36} c^3 h \operatorname{Log}[1-c x]-\frac{c h \operatorname{Log}[1-c x]}{12 x^2}-\frac{c^2 h \operatorname{Log}[1-c x]}{3 x}+\frac{1}{3} c^3 h \operatorname{Log}[c x] \operatorname{Log}[1-c x]^2+\frac{\operatorname{Log}[1-c x]\,(g+h \operatorname{Log}[1-c x])}{9 x^3}-\frac{c\,(g+2 h \operatorname{Log}[1-c x])}{18 x^2}-\frac{c^2\,(1-c x)\,(g+2 h \operatorname{Log}[1-c x])}{9 x}+\frac{1}{9} c^3\,(g+2 h \operatorname{Log}[1-c x]) \operatorname{Log}\left[1-\frac{1}{1-c x}\right]+\frac{c h \operatorname{PolyLog}[2, c x]}{6 x^2}+\frac{c^2 h \operatorname{PolyLog}[2, c x]}{3 x}+\frac{1}{3} c^3 h \operatorname{Log}[1-c x] \operatorname{PolyLog}[2, c x]-\frac{(g+h \operatorname{Log}[1-c x]) \operatorname{PolyLog}[2, c x]}{3 x^3}-\frac{2}{9} c^3 h \operatorname{PolyLog}\left[2, \frac{1}{1-c x}\right]+\frac{2}{3} c^3 h \operatorname{Log}[1-c x] \operatorname{PolyLog}[2,1-c x]-\frac{1}{3} c^3 h \operatorname{PolyLog}[3, c x]-\frac{2}{3} c^3 h \operatorname{PolyLog}[3,1-c x]$$

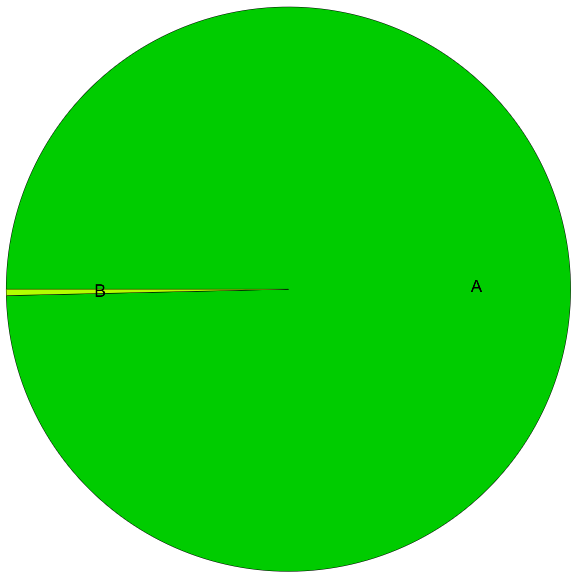
Result (type 4, 351 leaves, 42 steps):

$$\frac{7c^2 h}{36x}+\frac{1}{9}c^3 g \operatorname{Log}[x]-\frac{3}{4}c^3 h \operatorname{Log}[x]+\frac{23}{36}c^3 h \operatorname{Log}[1-cx]-\frac{5ch\operatorname{Log}[1-cx]}{36x^2}-$$
$$\frac{4c^2h\operatorname{Log}[1-cx]}{9x}-\frac{1}{18}c^3h\operatorname{Log}[1-cx]^2+\frac{1}{3}c^3h\operatorname{Log}[cx]\operatorname{Log}[1-cx]^2-$$
$$\frac{c\left(g+h\operatorname{Log}[1-cx]\right)}{18x^2}-\frac{c^2(1-cx)\left(g+h\operatorname{Log}[1-cx]\right)}{9x}+\frac{\operatorname{Log}[1-cx]\left(g+h\operatorname{Log}[1-cx]\right)}{9x^3}-$$
$$\frac{c^3\left(g+h\operatorname{Log}[1-cx]\right)^2}{18h}-\frac{2}{9}c^3h\operatorname{PolyLog}[2,cx]+\frac{ch\operatorname{PolyLog}[2,cx]}{6x^2}+\frac{c^2h\operatorname{PolyLog}[2,cx]}{3x}+$$
$$\frac{1}{3}c^3h\operatorname{Log}[1-cx]\operatorname{PolyLog}[2,cx]-\frac{\left(g+h\operatorname{Log}[1-cx]\right)\operatorname{PolyLog}[2,cx]}{3x^3}+$$
$$\frac{2}{3}c^3h\operatorname{Log}[1-cx]\operatorname{PolyLog}[2,1-cx]-\frac{1}{3}c^3h\operatorname{PolyLog}[3,cx]-\frac{2}{3}c^3h\operatorname{PolyLog}[3,1-cx]$$

Test results for the 398 problems in "8.9 Product logarithm function.m"

Summary of Integration Test Results

1949 integration problems



A - 1942 optimal antiderivatives

B - 7 valid but suboptimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 0 unable to integrate problems

E - 0 integration timeouts

F - 0 invalid antiderivatives