Rubi 4.16.0 Special Function Integration Test Results

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):

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

Problem 41: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 42: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 44: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 45: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 46: Result optimal but 3 more steps used.

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

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

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

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

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

Problem 143: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 144: Result optimal but 2 more steps used.

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

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):

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

Problem 145: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 147: Result optimal but 2 more steps used.

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

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

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

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

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

Problem 148: Result optimal but 2 more steps used.

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

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

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

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):

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

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

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

Problem 56: Result optimal but 4 more steps used.

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

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

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

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

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

Problem 58: Result optimal but 4 more steps used.

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

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

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

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

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

Problem 59: Result optimal but 4 more steps used.

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

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

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

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

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

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):

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

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

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

Problem 163: Result optimal but 4 more steps used.

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

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

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

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

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

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):

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

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

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

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.

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

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

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

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):

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

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

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

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):

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

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):

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

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

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

Problem 176: Result valid but suboptimal antiderivative.

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

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

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

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

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

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

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

Problem 24: Result valid but suboptimal antiderivative.

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

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):

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