

Rubi 4.16.1.4 Integration Test Results

on the problems in the test-suite directory "3 Logarithms"

Test results for the 193 problems in "3.1.2 (d x)^m (a+b log(c x^n))^p.m"

Test results for the 456 problems in "3.1.4 (f x)^m (d+e x^r)^q (a+b log(c x^n))^p.m"

Test results for the 249 problems in "3.1.5 u (a+b log(c x^n))^p.m"

Test results for the 314 problems in "3.2.1 (f+g x)^m (A+B log(e ((a+b x) over (c+d x))^n))^p.m"

Test results for the 263 problems in "3.2.2 (f+g x)^m (h+i x)^q (A+B log(e ((a+b x) over (c+d x))^n))^p.m"

Test results for the 108 problems in "3.2.3 u log(e (f (a+b x)^p (c+d x)^q)^r)^s.m"

Problem 39: Result valid but suboptimal antiderivative.

$$\int \frac{\text{Log}\left[e \left(f (a+b x)^p (c+d x)^q\right)^r\right]^2}{g+h x} dx$$

Optimal (type 4, 1471 leaves, ? steps):

$$\frac{p q r^2 \text{Log}\left[-\frac{b c-a d}{d (a+b x)}\right] \text{Log}\left[\frac{(b g-a h) (c+d x)}{(d g-c h) (a+b x)}\right]^2}{h} + \frac{p^2 r^2 \text{Log}[a+b x]^2 \text{Log}[g+h x]}{h} + \frac{2 p q r^2 \text{Log}[a+b x] \text{Log}[c+d x] \text{Log}[g+h x]}{h} + \frac{q^2 r^2 \text{Log}[c+d x]^2 \text{Log}[g+h x]}{h} -$$

$$\begin{aligned}
& \frac{2 p r \operatorname{Log}[a+b x] \operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right] \operatorname{Log}[g+h x]}{h} - \\
& \frac{2 q r \operatorname{Log}[c+d x] \operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right] \operatorname{Log}[g+h x]}{h} + \\
& \frac{\operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right]^2 \operatorname{Log}[g+h x]}{h} - \frac{p^2 r^2 \operatorname{Log}[a+b x]^2 \operatorname{Log}\left[\frac{b(g+h x)}{b g-a h}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{Log}[a+b x] \operatorname{Log}\left[-\frac{h(c+d x)}{d g-c h}\right] \operatorname{Log}\left[\frac{b(g+h x)}{b g-a h}\right]}{h} + \frac{p q r^2 \operatorname{Log}\left[-\frac{h(c+d x)}{d g-c h}\right]^2 \operatorname{Log}\left[\frac{b(g+h x)}{b g-a h}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{Log}\left[-\frac{h(c+d x)}{d g-c h}\right] \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right] \operatorname{Log}\left[\frac{b(g+h x)}{b g-a h}\right]}{h} + \frac{p q r^2 \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right]^2 \operatorname{Log}\left[\frac{b(g+h x)}{b g-a h}\right]}{h} + \\
& \frac{2 p r \operatorname{Log}[a+b x] \operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right] \operatorname{Log}\left[\frac{b(g+h x)}{b g-a h}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{Log}[a+b x] \operatorname{Log}[c+d x] \operatorname{Log}\left[\frac{d(g+h x)}{d g-c h}\right]}{h} - \frac{q^2 r^2 \operatorname{Log}[c+d x]^2 \operatorname{Log}\left[\frac{d(g+h x)}{d g-c h}\right]}{h} + \\
& \frac{2 p q r^2 \operatorname{Log}[a+b x] \operatorname{Log}\left[-\frac{h(c+d x)}{d g-c h}\right] \operatorname{Log}\left[\frac{d(g+h x)}{d g-c h}\right]}{h} - \frac{p q r^2 \operatorname{Log}\left[-\frac{h(c+d x)}{d g-c h}\right]^2 \operatorname{Log}\left[\frac{d(g+h x)}{d g-c h}\right]}{h} + \\
& \frac{2 p q r^2 \operatorname{Log}\left[-\frac{h(c+d x)}{d g-c h}\right] \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right] \operatorname{Log}\left[\frac{d(g+h x)}{d g-c h}\right]}{h} + \\
& \frac{2 q r \operatorname{Log}[c+d x] \operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right] \operatorname{Log}\left[\frac{d(g+h x)}{d g-c h}\right]}{h} - \\
& \frac{p q r^2 \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right]^2 \operatorname{Log}\left[-\frac{(b c-a d)(g+h x)}{(d g-c h)(a+b x)}\right]}{h} - \frac{1}{h} \\
& 2 p r \left(q r \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right] - \operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right] \right) \operatorname{PolyLog}\left[2, -\frac{h(a+b x)}{b g-a h}\right] + \\
& \frac{1}{h} 2 q r \left(p r \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right] + \operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right] \right) \operatorname{PolyLog}\left[2, -\frac{h(c+d x)}{d g-c h}\right] + \\
& \frac{2 p q r^2 \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right] \operatorname{PolyLog}\left[2, \frac{b(c+d x)}{d(a+b x)}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{Log}\left[\frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right] \operatorname{PolyLog}\left[2, \frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right]}{h} - \frac{2 p^2 r^2 \operatorname{PolyLog}\left[3, -\frac{h(a+b x)}{b g-a h}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{PolyLog}\left[3, -\frac{h(a+b x)}{b g-a h}\right]}{h} - \frac{2 p q r^2 \operatorname{PolyLog}\left[3, -\frac{h(c+d x)}{d g-c h}\right]}{h} - \frac{2 q^2 r^2 \operatorname{PolyLog}\left[3, -\frac{h(c+d x)}{d g-c h}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{b(c+d x)}{d(a+b x)}\right]}{h} + \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{(b g-a h)(c+d x)}{(d g-c h)(a+b x)}\right]}{h}
\end{aligned}$$

Result (type 4, 2096 leaves, 29 steps):

$$\begin{aligned}
& - \frac{\text{Log}[(a+bx)^{pr}]^2 \text{Log}[g+hx]}{h} - \frac{2pqr^2 \text{Log}\left[-\frac{d(a+bx)}{bc-ad}\right] \text{Log}[c+dx] \text{Log}[g+hx]}{h} - \\
& \frac{2pqr^2 \text{Log}[a+bx] \text{Log}\left[\frac{b(c+dx)}{bc-ad}\right] \text{Log}[g+hx]}{h} + \frac{1}{h} \\
& 2qr \left(pr \text{Log}[a+bx] - \text{Log}[(a+bx)^{pr}] \right) \text{Log}\left[-\frac{h(c+dx)}{dg-ch}\right] \text{Log}[g+hx] + \frac{1}{h} \\
& 2pr \text{Log}\left[-\frac{h(a+bx)}{bg-ah}\right] \left(qr \text{Log}[c+dx] - \text{Log}[(c+dx)^{qr}] \right) \text{Log}[g+hx] - \\
& \frac{\text{Log}[(c+dx)^{qr}]^2 \text{Log}[g+hx]}{h} + \frac{1}{h} 2pr \text{Log}\left[-\frac{h(a+bx)}{bg-ah}\right] \\
& \left(\text{Log}[(a+bx)^{pr}] + \text{Log}[(c+dx)^{qr}] - \text{Log}[e(f(a+bx)^p(c+dx)^q)^r] \right) \text{Log}[g+hx] + \frac{1}{h} \\
& 2qr \text{Log}\left[-\frac{h(c+dx)}{dg-ch}\right] \left(\text{Log}[(a+bx)^{pr}] + \text{Log}[(c+dx)^{qr}] - \text{Log}[e(f(a+bx)^p(c+dx)^q)^r] \right) \\
& \text{Log}[g+hx] + \frac{\text{Log}[e(f(a+bx)^p(c+dx)^q)^r]^2 \text{Log}[g+hx]}{h} + \\
& \frac{\text{Log}[(a+bx)^{pr}]^2 \text{Log}\left[\frac{b(g+hx)}{bg-ah}\right]}{h} + \frac{\text{Log}[(c+dx)^{qr}]^2 \text{Log}\left[\frac{d(g+hx)}{dg-ch}\right]}{h} - \frac{1}{h} pqr^2 \\
& \left(\text{Log}\left[\frac{b(c+dx)}{bc-ad}\right] + \text{Log}\left[\frac{bg-ah}{b(g+hx)}\right] - \text{Log}\left[\frac{(bg-ah)(c+dx)}{(bc-ad)(g+hx)}\right] \right) \text{Log}\left[-\frac{(bc-ad)(g+hx)}{(dg-ch)(a+bx)}\right]^2 + \frac{1}{h} \\
& pqr^2 \left(\text{Log}\left[\frac{b(c+dx)}{bc-ad}\right] - \text{Log}\left[-\frac{h(c+dx)}{dg-ch}\right] \right) \left(\text{Log}[a+bx] + \text{Log}\left[-\frac{(bc-ad)(g+hx)}{(dg-ch)(a+bx)}\right] \right)^2 - \frac{1}{h} pqr^2 \\
& \left(\text{Log}\left[-\frac{d(a+bx)}{bc-ad}\right] + \text{Log}\left[\frac{dg-ch}{d(g+hx)}\right] - \text{Log}\left[-\frac{(dg-ch)(a+bx)}{(bc-ad)(g+hx)}\right] \right) \text{Log}\left[\frac{(bc-ad)(g+hx)}{(bg-ah)(c+dx)}\right]^2 + \\
& \frac{1}{h} pqr^2 \left(\text{Log}\left[-\frac{d(a+bx)}{bc-ad}\right] - \text{Log}\left[-\frac{h(a+bx)}{bg-ah}\right] \right) \left(\text{Log}[c+dx] + \text{Log}\left[\frac{(bc-ad)(g+hx)}{(bg-ah)(c+dx)}\right] \right)^2 - \\
& \frac{1}{h} 2pqr^2 \left(\text{Log}[g+hx] - \text{Log}\left[-\frac{(bc-ad)(g+hx)}{(dg-ch)(a+bx)}\right] \right) \text{PolyLog}\left[2, -\frac{d(a+bx)}{bc-ad}\right] + \\
& \frac{2pr \text{Log}[(a+bx)^{pr}] \text{PolyLog}\left[2, -\frac{h(a+bx)}{bg-ah}\right]}{h} - \\
& \frac{2pqr^2 \left(\text{Log}[g+hx] - \text{Log}\left[\frac{(bc-ad)(g+hx)}{(bg-ah)(c+dx)}\right] \right) \text{PolyLog}\left[2, \frac{b(c+dx)}{bc-ad}\right]}{h} + \\
& \frac{2qr \text{Log}[(c+dx)^{qr}] \text{PolyLog}\left[2, -\frac{h(c+dx)}{dg-ch}\right]}{h} + \frac{2pqr^2 \text{Log}\left[-\frac{(bc-ad)(g+hx)}{(dg-ch)(a+bx)}\right] \text{PolyLog}\left[2, \frac{h(a+bx)}{b(g+hx)}\right]}{h} - \\
& \frac{2pqr^2 \text{Log}\left[-\frac{(bc-ad)(g+hx)}{(dg-ch)(a+bx)}\right] \text{PolyLog}\left[2, -\frac{(dg-ch)(a+bx)}{(bc-ad)(g+hx)}\right]}{h} + \\
& \frac{2pqr^2 \text{Log}\left[\frac{(bc-ad)(g+hx)}{(bg-ah)(c+dx)}\right] \text{PolyLog}\left[2, \frac{h(c+dx)}{d(g+hx)}\right]}{h} -
\end{aligned}$$

$$\begin{aligned}
& \frac{2 p q r^2 \operatorname{Log}\left[\frac{(b c-a d)(g+h x)}{(b g-a h)(c+d x)}\right] \operatorname{PolyLog}\left[2, \frac{(b g-a h)(c+d x)}{(b c-a d)(g+h x)}\right]}{h} + \\
& \frac{2 p r\left(q r \operatorname{Log}[c+d x]-\operatorname{Log}\left[(c+d x)^{q r}\right]\right) \operatorname{PolyLog}\left[2, \frac{b(g+h x)}{b g-a h}\right]}{h} + \frac{1}{h} \\
& 2 p r\left(\operatorname{Log}\left[(a+b x)^{p r}\right]+\operatorname{Log}\left[(c+d x)^{q r}\right]-\operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right]\right) \\
& \operatorname{PolyLog}\left[2, \frac{b(g+h x)}{b g-a h}\right]-\frac{2 p q r^2\left(\operatorname{Log}[c+d x]+\operatorname{Log}\left[\frac{(b c-a d)(g+h x)}{(b g-a h)(c+d x)}\right]\right) \operatorname{PolyLog}\left[2, \frac{b(g+h x)}{b g-a h}\right]}{h} + \\
& \frac{2 q r\left(p r \operatorname{Log}[a+b x]-\operatorname{Log}\left[(a+b x)^{p r}\right]\right) \operatorname{PolyLog}\left[2, \frac{d(g+h x)}{d g-c h}\right]}{h} + \frac{1}{h} 2 q r \\
& \left(\operatorname{Log}\left[(a+b x)^{p r}\right]+\operatorname{Log}\left[(c+d x)^{q r}\right]-\operatorname{Log}\left[e\left(f(a+b x)^p(c+d x)^q\right)^r\right]\right) \operatorname{PolyLog}\left[2, \frac{d(g+h x)}{d g-c h}\right]- \\
& \frac{2 p q r^2\left(\operatorname{Log}[a+b x]+\operatorname{Log}\left[-\frac{(b c-a d)(g+h x)}{(d g-c h)(a+b x)}\right]\right) \operatorname{PolyLog}\left[2, \frac{d(g+h x)}{d g-c h}\right]}{h} + \frac{2 p q r^2 \operatorname{PolyLog}\left[3, -\frac{d(a+b x)}{b c-a d}\right]}{h} - \\
& \frac{2 p^2 r^2 \operatorname{PolyLog}\left[3, -\frac{h(a+b x)}{b g-a h}\right]}{h} + \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{b(c+d x)}{b c-a d}\right]}{h} - \frac{2 q^2 r^2 \operatorname{PolyLog}\left[3, -\frac{h(c+d x)}{d g-c h}\right]}{h} + \\
& \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{h(a+b x)}{b(g+h x)}\right]}{h} - \frac{2 p q r^2 \operatorname{PolyLog}\left[3, -\frac{(d g-c h)(a+b x)}{(b c-a d)(g+h x)}\right]}{h} + \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{h(c+d x)}{d(g+h x)}\right]}{h} - \\
& \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{(b g-a h)(c+d x)}{(b c-a d)(g+h x)}\right]}{h} + \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{b(g+h x)}{b g-a h}\right]}{h} + \frac{2 p q r^2 \operatorname{PolyLog}\left[3, \frac{d(g+h x)}{d g-c h}\right]}{h}
\end{aligned}$$

Problem 74: Unable to integrate problem.

$$\int \left(\frac{1}{(c+d x)(-a+c+(-b+d)x) \operatorname{Log}\left[\frac{a+b x}{c+d x}\right]} + \frac{\operatorname{Log}\left[1-\frac{a+b x}{c+d x}\right]}{(a+b x)(c+d x) \operatorname{Log}\left[\frac{a+b x}{c+d x}\right]^2} \right) dx$$

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

$$-\frac{\operatorname{Log}\left[1-\frac{a+b x}{c+d x}\right]}{(b c-a d) \operatorname{Log}\left[\frac{a+b x}{c+d x}\right]}$$

Result (type 8, 152 leaves, 3 steps):

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

Problem 75: Unable to integrate problem.

$$\int \left(-\frac{1}{(a+bx)(a-c+(b-d)x) \operatorname{Log}\left[\frac{a+bx}{c+dx}\right]} + \frac{\operatorname{Log}\left[1 - \frac{c+dx}{a+bx}\right]}{(a+bx)(c+dx) \operatorname{Log}\left[\frac{a+bx}{c+dx}\right]^2} \right) dx$$

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

$$-\frac{\operatorname{Log}\left[1 - \frac{c+dx}{a+bx}\right]}{(bc-ad) \operatorname{Log}\left[\frac{a+bx}{c+dx}\right]}$$

Result (type 8, 154 leaves, 3 steps):

$$\frac{b \operatorname{CannotIntegrate}\left[\frac{\operatorname{Log}\left[1 - \frac{c+dx}{a+bx}\right]}{(a+bx) \operatorname{Log}\left[\frac{a+bx}{c+dx}\right]^2}, x\right] - d \operatorname{CannotIntegrate}\left[\frac{\operatorname{Log}\left[1 - \frac{c+dx}{a+bx}\right]}{(c+dx) \operatorname{Log}\left[\frac{a+bx}{c+dx}\right]^2}, x\right]}{bc-ad} - \operatorname{Unintegrable}\left[\frac{1}{(a+bx)(a-c+(b-d)x) \operatorname{Log}\left[\frac{a+bx}{c+dx}\right]}, x\right]$$

Test results for the 547 problems in "3.3 u (a+b log(c (d+e x)^n))^p.m"

Problem 370: Unable to integrate problem.

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

Optimal (type 4, 823 leaves, ? steps):

$$\begin{aligned}
& \frac{1}{2} m \operatorname{Log}[x]^2 \left(a - b n \operatorname{Log}[d + e x] + b \operatorname{Log}\left[c (d + e x)^n\right] \right)^2 + \\
& \operatorname{Log}[x] \left(-m \operatorname{Log}[x] + \operatorname{Log}[f x^m] \right) \left(a - b n \operatorname{Log}[d + e x] + b \operatorname{Log}\left[c (d + e x)^n\right] \right)^2 + \\
& 2 b n \left(-m \operatorname{Log}[x] + \operatorname{Log}[f x^m] \right) \left(a - b n \operatorname{Log}[d + e x] + b \operatorname{Log}\left[c (d + e x)^n\right] \right) \\
& \left(\operatorname{Log}[x] \left(\operatorname{Log}[d + e x] - \operatorname{Log}\left[1 + \frac{e x}{d}\right] \right) - \operatorname{PolyLog}\left[2, -\frac{e x}{d}\right] \right) + \\
& 2 b m n \left(a - b n \operatorname{Log}[d + e x] + b \operatorname{Log}\left[c (d + e x)^n\right] \right) \\
& \left(\frac{1}{2} \operatorname{Log}[x]^2 \left(\operatorname{Log}[d + e x] - \operatorname{Log}\left[1 + \frac{e x}{d}\right] \right) - \operatorname{Log}[x] \operatorname{PolyLog}\left[2, -\frac{e x}{d}\right] + \operatorname{PolyLog}\left[3, -\frac{e x}{d}\right] \right) - \\
& b^2 n^2 \left(m \operatorname{Log}[x] - \operatorname{Log}[f x^m] \right) \\
& \left(\operatorname{Log}\left[-\frac{e x}{d}\right] \operatorname{Log}[d + e x]^2 + 2 \operatorname{Log}[d + e x] \operatorname{PolyLog}\left[2, 1 + \frac{e x}{d}\right] - 2 \operatorname{PolyLog}\left[3, 1 + \frac{e x}{d}\right] \right) + \\
& \frac{1}{12} b^2 m n^2 \left(\operatorname{Log}\left[-\frac{e x}{d}\right]^4 + 6 \operatorname{Log}\left[-\frac{e x}{d}\right]^2 \operatorname{Log}\left[-\frac{e x}{d + e x}\right]^2 - \right. \\
& 4 \left(\operatorname{Log}\left[-\frac{e x}{d}\right] + \operatorname{Log}\left[\frac{d}{d + e x}\right] \right) \operatorname{Log}\left[-\frac{e x}{d + e x}\right]^3 + \operatorname{Log}\left[-\frac{e x}{d + e x}\right]^4 + \\
& 6 \operatorname{Log}[x]^2 \operatorname{Log}[d + e x]^2 + 4 \left(2 \operatorname{Log}\left[-\frac{e x}{d}\right]^3 - 3 \operatorname{Log}[x]^2 \operatorname{Log}[d + e x] \right) \operatorname{Log}\left[1 + \frac{e x}{d}\right] + \\
& 6 \left(\operatorname{Log}[x] - \operatorname{Log}\left[-\frac{e x}{d}\right] \right) \left(\operatorname{Log}[x] + 3 \operatorname{Log}\left[-\frac{e x}{d}\right] \right) \operatorname{Log}\left[1 + \frac{e x}{d}\right]^2 - 4 \operatorname{Log}\left[-\frac{e x}{d}\right]^2 \operatorname{Log}\left[-\frac{e x}{d + e x}\right] \\
& \left(\operatorname{Log}\left[-\frac{e x}{d}\right] + 3 \operatorname{Log}\left[1 + \frac{e x}{d}\right] \right) + 12 \left(\operatorname{Log}\left[-\frac{e x}{d}\right]^2 - 2 \operatorname{Log}\left[-\frac{e x}{d}\right] \left(\operatorname{Log}\left[-\frac{e x}{d + e x}\right] + \operatorname{Log}\left[1 + \frac{e x}{d}\right] \right) \right) + \\
& 2 \operatorname{Log}[x] \left(-\operatorname{Log}[d + e x] + \operatorname{Log}\left[1 + \frac{e x}{d}\right] \right) \operatorname{PolyLog}\left[2, -\frac{e x}{d}\right] - \\
& 12 \operatorname{Log}\left[-\frac{e x}{d + e x}\right]^2 \operatorname{PolyLog}\left[2, \frac{e x}{d + e x}\right] + 12 \left(\operatorname{Log}\left[-\frac{e x}{d}\right] - \operatorname{Log}\left[-\frac{e x}{d + e x}\right] \right)^2 \operatorname{PolyLog}\left[2, 1 + \frac{e x}{d}\right] + \\
& 24 \left(\operatorname{Log}[x] - \operatorname{Log}\left[-\frac{e x}{d}\right] \right) \operatorname{Log}\left[1 + \frac{e x}{d}\right] \operatorname{PolyLog}\left[2, 1 + \frac{e x}{d}\right] + \\
& 24 \left(\operatorname{Log}\left[-\frac{e x}{d + e x}\right] + \operatorname{Log}[d + e x] \right) \operatorname{PolyLog}\left[3, -\frac{e x}{d}\right] + \\
& 24 \operatorname{Log}\left[-\frac{e x}{d + e x}\right] \operatorname{PolyLog}\left[3, \frac{e x}{d + e x}\right] + 24 \left(-\operatorname{Log}[x] + \operatorname{Log}\left[-\frac{e x}{d + e x}\right] \right) \operatorname{PolyLog}\left[3, 1 + \frac{e x}{d}\right] - \\
& 24 \left(\operatorname{PolyLog}\left[4, -\frac{e x}{d}\right] + \operatorname{PolyLog}\left[4, \frac{e x}{d + e x}\right] - \operatorname{PolyLog}\left[4, 1 + \frac{e x}{d}\right] \right) \Big)
\end{aligned}$$

Result (type 8, 72 leaves, 1 step):

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

Problem 371: Unable to integrate problem.

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

Optimal (type 4, 607 leaves, ? steps):

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

Result (type 8, 28 leaves, 0 steps):

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

Problem 372: Unable to integrate problem.

$$\int \frac{\operatorname{Log}[f x^m] \left(a + b \operatorname{Log}\left[c (d + e x)^n \right] \right)^2}{x^3} dx$$

Optimal (type 4, 939 leaves, ? steps):

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

Result (type 8, 28 leaves, 0 steps):

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

Problem 374: Unable to integrate problem.

$$\int \frac{\operatorname{Log}[x] \operatorname{Log}[a + b x]^2}{x} dx$$

Optimal (type 4, 519 leaves, ? steps):

$$\begin{aligned}
& \frac{1}{12} \left(\text{Log}\left[-\frac{bx}{a}\right]^4 + 6 \text{Log}\left[-\frac{bx}{a}\right]^2 \text{Log}\left[-\frac{bx}{a+bx}\right]^2 - 4 \left(\text{Log}\left[-\frac{bx}{a}\right] + \text{Log}\left[\frac{a}{a+bx}\right] \right) \text{Log}\left[-\frac{bx}{a+bx}\right]^3 + \right. \\
& \quad \left. \text{Log}\left[-\frac{bx}{a+bx}\right]^4 + 6 \text{Log}[x]^2 \text{Log}[a+bx]^2 + 4 \left(2 \text{Log}\left[-\frac{bx}{a}\right]^3 - 3 \text{Log}[x]^2 \text{Log}[a+bx] \right) \text{Log}\left[1 + \frac{bx}{a}\right] + \right. \\
& \quad 6 \left(\text{Log}[x] - \text{Log}\left[-\frac{bx}{a}\right] \right) \left(\text{Log}[x] + 3 \text{Log}\left[-\frac{bx}{a}\right] \right) \text{Log}\left[1 + \frac{bx}{a}\right]^2 - \\
& \quad 4 \text{Log}\left[-\frac{bx}{a}\right]^2 \text{Log}\left[-\frac{bx}{a+bx}\right] \left(\text{Log}\left[-\frac{bx}{a}\right] + 3 \text{Log}\left[1 + \frac{bx}{a}\right] \right) + \\
& \quad 12 \left(\text{Log}\left[-\frac{bx}{a}\right]^2 - 2 \text{Log}\left[-\frac{bx}{a}\right] \left(\text{Log}\left[-\frac{bx}{a+bx}\right] + \text{Log}\left[1 + \frac{bx}{a}\right] \right) + \right. \\
& \quad \left. 2 \text{Log}[x] \left(-\text{Log}[a+bx] + \text{Log}\left[1 + \frac{bx}{a}\right] \right) \right) \text{PolyLog}\left[2, -\frac{bx}{a}\right] - \\
& \quad 12 \text{Log}\left[-\frac{bx}{a+bx}\right]^2 \text{PolyLog}\left[2, \frac{bx}{a+bx}\right] + 12 \left(\text{Log}\left[-\frac{bx}{a}\right] - \text{Log}\left[-\frac{bx}{a+bx}\right] \right)^2 \text{PolyLog}\left[2, 1 + \frac{bx}{a}\right] + \\
& \quad 24 \left(\text{Log}[x] - \text{Log}\left[-\frac{bx}{a}\right] \right) \text{Log}\left[1 + \frac{bx}{a}\right] \text{PolyLog}\left[2, 1 + \frac{bx}{a}\right] + \\
& \quad 24 \left(\text{Log}\left[-\frac{bx}{a+bx}\right] + \text{Log}[a+bx] \right) \text{PolyLog}\left[3, -\frac{bx}{a}\right] + \\
& \quad 24 \text{Log}\left[-\frac{bx}{a+bx}\right] \text{PolyLog}\left[3, \frac{bx}{a+bx}\right] + 24 \left(-\text{Log}[x] + \text{Log}\left[-\frac{bx}{a+bx}\right] \right) \text{PolyLog}\left[3, 1 + \frac{bx}{a}\right] - \\
& \quad 24 \left(\text{PolyLog}\left[4, -\frac{bx}{a}\right] + \text{PolyLog}\left[4, \frac{bx}{a+bx}\right] - \text{PolyLog}\left[4, 1 + \frac{bx}{a}\right] \right) \Big)
\end{aligned}$$

Result (type 8, 40 leaves, 1 step):

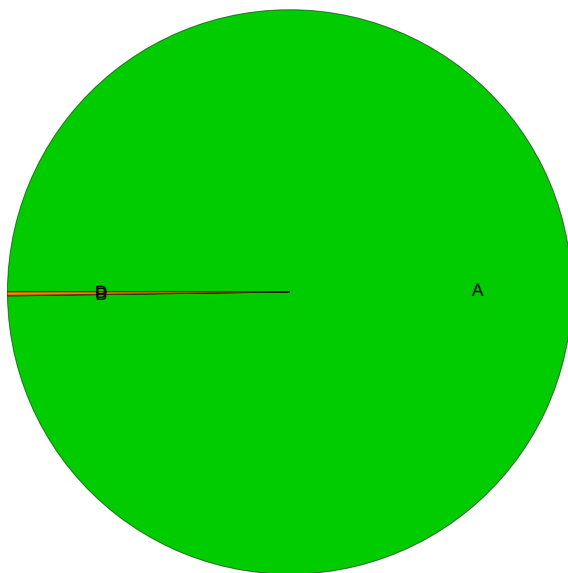
$$\frac{1}{2} \text{Log}[x]^2 \text{Log}[a+bx]^2 - b \text{Unintegrable}\left[\frac{\text{Log}[x]^2 \text{Log}[a+bx]}{a+bx}, x\right]$$

Test results for the 641 problems in "3.4 u (a+b log(c (d+e x^m)^n))^p.m"

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

Summary of Integration Test Results

3085 integration problems



A - 3078 optimal antiderivatives

B - 1 valid but suboptimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 6 unable to integrate problems

E - 0 integration timeouts

F - 0 invalid antiderivatives