

Rubi 4.16.1.4 Integration Test Results

on the problems in the test-suite directory "7
Inverse hyperbolic functions"

Test results for the 156 problems in "7.1.2 (d x)^m (a+b arcsinh(c x))^n.m"

Test results for the 663 problems in "7.1.4 (f x)^m (d+e x^2)^p (a+b arcsinh(c x))^n.m"

Test results for the 371 problems in "7.1.5 Inverse hyperbolic sine functions.m"

Problem 369: Unable to integrate problem.

$$\int \frac{x}{\text{ArcSinh}[\text{Sinh}[x]]} dx$$

Optimal (type 3, 27 leaves, ? steps):

$$\text{ArcSinh}[\text{Sinh}[x]] + \text{Log}[\text{ArcSinh}[\text{Sinh}[x]]] \left(-\text{ArcSinh}[\text{Sinh}[x]] + x \sqrt{\text{Cosh}[x]^2} \text{Sech}[x] \right)$$

Result (type 8, 9 leaves, 0 steps):

$$\text{CannotIntegrate}\left[\frac{x}{\text{ArcSinh}[\text{Sinh}[x]]}, x\right]$$

Test results for the 166 problems in "7.2.2 (d x)^m (a+b arccosh(c x))^n.m"

Test results for the 569 problems in "7.2.4 (f x)^m (d+e x^2)^p (a+b arccosh(c x))^n.m"

Test results for the 296 problems in "7.2.5 Inverse hyperbolic cosine

functions.m"

Problem 61: Unable to integrate problem.

$$\int \frac{(d - c^2 x^2)^{3/2} (a + b \operatorname{ArcCosh}[c x])}{f + g x} dx$$

Optimal (type 4, 1270 leaves, ? steps):

$$\begin{aligned}
& - \frac{a d (c f - g) (c f + g) \sqrt{d - c^2 d x^2}}{g^3} + \\
& \frac{b c d (c f - g) (c f + g) x \sqrt{d - c^2 d x^2}}{g^3 \sqrt{-1 + c x} \sqrt{1 + c x}} - \frac{b c^2 d (c f - g) x^2 \sqrt{d - c^2 d x^2}}{4 g^2 \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{a d (2 + 3 c x - 2 c^2 x^2) \sqrt{d - c^2 d x^2}}{6 g} + \frac{b c d x (-12 - 9 c x + 4 c^2 x^2) \sqrt{d - c^2 d x^2}}{36 g \sqrt{-1 + c x} \sqrt{1 + c x}} - \\
& \frac{b d (c f - g) (c f + g) \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x]}{g^3} - \frac{a d \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x]}{2 g \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{b d (2 + 3 c x - 2 c^2 x^2) \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x]}{6 g} - \frac{b d \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x]^2}{4 g \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{c d (c f - g) x \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])}{2 g^2} - \frac{d (c f - g) \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{4 b g^2 \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{c d (c f - g) (c f + g) x \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{2 b g^3 \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{d (c f - g)^2 (c f + g)^2 \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{2 b c g^4 \sqrt{-1 + c x} \sqrt{1 + c x} (f + g x)} + \\
& \frac{d (c f - g) (c f + g) (1 - c^2 x^2) \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{2 b c g^2 \sqrt{-1 + c x} \sqrt{1 + c x} (f + g x)} - \\
& \frac{2 a d (c f - g)^{3/2} (c f + g)^{3/2} \sqrt{d - c^2 d x^2} \operatorname{ArcTanh}\left[\frac{\sqrt{c f + g} \sqrt{1 + c x}}{\sqrt{c f - g} \sqrt{-1 + c x}}\right]}{g^4 \sqrt{-1 + c x} \sqrt{1 + c x}} - \\
& \left(\frac{b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x] \operatorname{Log}\left[1 + \frac{e^{\operatorname{ArcCosh}[c x]} g}{c f - \sqrt{c^2 f^2 - g^2}}\right]}{c f - \sqrt{c^2 f^2 - g^2}} \right) / \\
& \left(g^4 \sqrt{-1 + c x} \sqrt{1 + c x} \right) + \\
& \left(\frac{b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x] \operatorname{Log}\left[1 + \frac{e^{\operatorname{ArcCosh}[c x]} g}{c f + \sqrt{c^2 f^2 - g^2}}\right]}{c f + \sqrt{c^2 f^2 - g^2}} \right) / \\
& \left(g^4 \sqrt{-1 + c x} \sqrt{1 + c x} \right) - \\
& \left(\frac{b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{PolyLog}\left[2, -\frac{e^{\operatorname{ArcCosh}[c x]} g}{c f - \sqrt{c^2 f^2 - g^2}}\right]}{c f - \sqrt{c^2 f^2 - g^2}} \right) / \\
& \left(g^4 \sqrt{-1 + c x} \sqrt{1 + c x} \right) + \\
& \left(\frac{b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{PolyLog}\left[2, -\frac{e^{\operatorname{ArcCosh}[c x]} g}{c f + \sqrt{c^2 f^2 - g^2}}\right]}{c f + \sqrt{c^2 f^2 - g^2}} \right) / \\
& \left(g^4 \sqrt{-1 + c x} \sqrt{1 + c x} \right)
\end{aligned}$$

Result (type 8, 1150 leaves, 28 steps):

$$\begin{aligned}
& \frac{b c d (c f - g) (c f + g) x \sqrt{d - c^2 d x^2}}{g^3 \sqrt{-1 + c x} \sqrt{1 + c x}} - \frac{b c^2 d (c f - g) x^2 \sqrt{d - c^2 d x^2}}{4 g^2 \sqrt{-1 + c x} \sqrt{1 + c x}} - \\
& \frac{a d (c f - g) (c f + g) (1 - c^2 x^2) \sqrt{d - c^2 d x^2}}{g^3 (1 - c x) (1 + c x)} - \frac{b d (c f - g) (c f + g) \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x]}{g^3} + \\
& \frac{c d (c f - g) x \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])}{2 g^2} - \frac{d (c f - g) \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{4 b g^2 \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{c d (c f - g) (c f + g) x \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{2 b g^3 \sqrt{-1 + c x} \sqrt{1 + c x}} + \\
& \frac{d (c f - g)^2 (c f + g)^2 \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{2 b c g^4 \sqrt{-1 + c x} \sqrt{1 + c x} (f + g x)} + \\
& \frac{d (c f - g) (c f + g) (1 - c^2 x^2) \sqrt{d - c^2 d x^2} (a + b \operatorname{ArcCosh}[c x])^2}{2 b c g^2 \sqrt{-1 + c x} \sqrt{1 + c x} (f + g x)} + \\
& \left(a d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{-1 + c^2 x^2} \sqrt{d - c^2 d x^2} \operatorname{ArcTanh}\left[\frac{g + c^2 f x}{\sqrt{c^2 f^2 - g^2} \sqrt{-1 + c^2 x^2}}\right] \right) / \\
& (g^4 (1 - c x) (1 + c x)) - \\
& \left(b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x] \operatorname{Log}\left[1 + \frac{e^{\operatorname{ArcCosh}[c x]} g}{c f - \sqrt{c^2 f^2 - g^2}}\right] \right) / \\
& (g^4 \sqrt{-1 + c x} \sqrt{1 + c x}) + \\
& \left(b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{ArcCosh}[c x] \operatorname{Log}\left[1 + \frac{e^{\operatorname{ArcCosh}[c x]} g}{c f + \sqrt{c^2 f^2 - g^2}}\right] \right) / \\
& (g^4 \sqrt{-1 + c x} \sqrt{1 + c x}) - \\
& \left(b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{PolyLog}\left[2, -\frac{e^{\operatorname{ArcCosh}[c x]} g}{c f - \sqrt{c^2 f^2 - g^2}}\right] \right) / \\
& (g^4 \sqrt{-1 + c x} \sqrt{1 + c x}) + \\
& \left(b d (c f - g) (c f + g) \sqrt{c^2 f^2 - g^2} \sqrt{d - c^2 d x^2} \operatorname{PolyLog}\left[2, -\frac{e^{\operatorname{ArcCosh}[c x]} g}{c f + \sqrt{c^2 f^2 - g^2}}\right] \right) / \\
& (g^4 \sqrt{-1 + c x} \sqrt{1 + c x}) - \\
& \left(c d \sqrt{d - c^2 d x^2} \operatorname{Unintegrable}\left[(-1 + c x)^{3/2} \sqrt{1 + c x} (a + b \operatorname{ArcCosh}[c x]), x\right] \right) / \\
& (g \sqrt{-1 + c x} \sqrt{1 + c x})
\end{aligned}$$

Test results for the 243 problems in "7.3.2 (d x)^m (a+b arctanh(c

$x^n)^{p.m}$

Test results for the 49 problems in "7.3.3 $(d+e x)^m (a+b \operatorname{arctanh}(c x^n))^{p.m}$ "

Test results for the 538 problems in "7.3.4 $u (a+b \operatorname{arctanh}(c x))^{p.m}$ "

Test results for the 62 problems in "7.3.5 $u (a+b \operatorname{arctanh}(c+d x))^{p.m}$ "

Test results for the 1378 problems in "7.3.6 Exponentials of inverse hyperbolic tangent functions.m"

Test results for the 361 problems in "7.3.7 Inverse hyperbolic tangent functions.m"

Test results for the 300 problems in "7.4.1 Inverse hyperbolic cotangent functions.m"

Test results for the 935 problems in "7.4.2 Exponentials of inverse hyperbolic cotangent functions.m"

Test results for the 190 problems in "7.5.1 $u (a+b \operatorname{arcsech}(c x))^n.m$ "

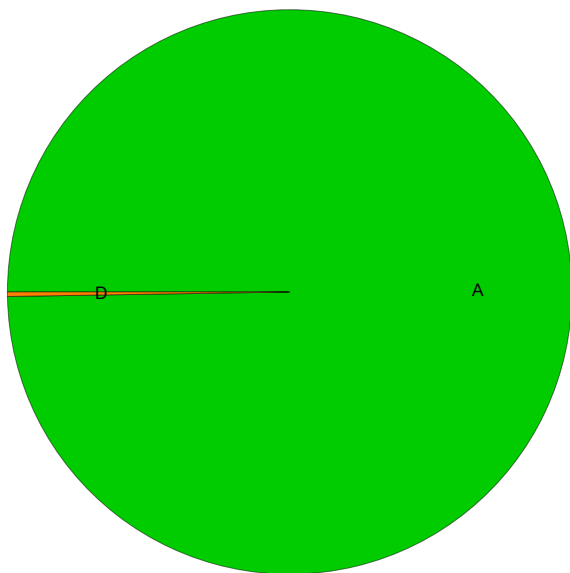
Test results for the 100 problems in "7.5.2 Inverse hyperbolic secant functions.m"

Test results for the 178 problems in "7.6.1 $u (a+b \operatorname{arccsch}(c x))^n.m$ "

Test results for the 71 problems in "7.6.2 Inverse hyperbolic cosecant functions.m"

Summary of Integration Test Results

6650 integration problems



A - 6633 optimal antiderivatives

B - 0 valid but suboptimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 17 unable to integrate problems

E - 0 integration timeouts

F - 0 invalid antiderivatives