

```
1: load_package "algint";
2: on tra;
3: on trint;
4: int(asin(x)*log(x),x);
```

Start of Integration; integrand is

$$\arcsin(x) \log(x)$$

Determination of the differential field descriptor gives the functions:

```
((asin x) (log x) (sqrt (plus (minus (expt x 2)) 1)) x)
```

Integrand is transformed by substitution to

$$\arcsin\left(\sin(g_0)\right) \cos(g_0) \log\left(\sin(g_0)\right)$$

using substitution x ->

$$\sin(g_0)$$

Start of Integration; integrand is

$$\arcsin\left(\sin(g_0)\right) \cos(g_0) \log\left(\sin(g_0)\right)$$

Determination of the differential field descriptor gives the functions:

```
((log (sin g0)) (asin (sin g0)) (sin g0) (cos g0) g0)
```

Extension variables z<i> are

```
((log (sin g0)) (asin (sin g0)) (sin g0) (cos g0) g0)
```

After unnormalization the integrand is

$$\frac{\arcsin\left(\sin(g_0)\right) \cos(g_0) \log\left(\sin(g_0)\right) \sin(g_0)}{\sin(g_0)}$$

Factors of multiplicity 1:

$$\sin(g_0)$$

Denominator of 1st part of answer is:

```
(Constants Created for log and tan terms: (!c1 . 1))
```

Loglist

```
((log (((!c1 . 1) . 1) (((sin g0) . 1) . 1)) . 1))
```

***** 'Derivative' of logs is:

$$\cos(g_0)!c_1$$

Distributed Form of Numerator is:

Distributed Form of Numerator is:

$$g_0^{-j} \sin(g_0)^{-m+2} \log(\sin(g_0))^{-p} \cos(g_0)^{-k-1} \arcsin(\sin(g_0))^{-n}$$

$$g_0^{-j-1} \sin(g_0)^{-m+1} \log(\sin(g_0))^{-p} \cos(g_0)^{-k} \arcsin(\sin(g_0))^{-n}$$

$$g_0^{-j} \sin(g_0)^{-m} \log(\sin(g_0))^{-p} \cos(g_0)^{-k+1} \arcsin(\sin(g_0))^{-n}$$

$$g_0^{-j} \sin(g_0)^{-m+1} \log(\sin(g_0))^{-p} \cos(g_0)^{-k} \arcsin(\sin(g_0))^{-n-1}$$

$$g_0^{-j} \sin(g_0)^{-m} \log(\sin(g_0))^{-p-1} \cos(g_0)^{-k+1} \arcsin(\sin(g_0))^{-n}$$

Distributed Form of integrand is:

$$\frac{\arcsin(\sin(g_0)) \cos(g_0) \log(\sin(g_0)) \sin(g_0)}{\cos(g_0)}$$

Maximum order for variables determined as

(2 2 2 2 1)

*** Introduce new constants for coefficients

***** U(1 1 0 1 1) =

!!c2

***** U(1 1 1 0 0) =

!!c3

***** U(1 2 0 1 0) =

!!c4

Introduced terms: (1 2 2 0 0)* (

$$-!c_4$$

)

Introduced terms: (1 1 2 0 1)* (

$$-!c_2$$

)

Introduced terms: (1 1 1 1 0)* (

$$!c_2 + !c_3 + 2!c_4$$

)

Introduced terms: (1 0 2 0 0)* (

$$!c_3$$

\

```

Introduced terms: (1 0 1 1 1)*(
                                |c2
)
Introduced terms: (0 2 0 2 0)*(
                                |c4
)
Introduced terms: (0 1 1 1 0)*(
                                |c3
)
Introduced terms: (0 1 0 2 1)*(
                                |c2
)
Constant map changed to ((!!c4 . 2) (!!c1 . 1))
Constant map changed to ((!!c3 . 3) (!!c4 . 2) (!!c1 . 1))
Constant map changed to ((!!c2 . 4) (!!c3 . 3) (!!c4 . 2) (!!c1 . 1))
A coefficient of numerator has been determined
***** U(2 1 1 0 0) =

```

$$\frac{-|c_2 - |c_3 - 2|c_4 + 1}{2}$$

Terms remaining are:

$$\frac{\arcsin(\sin(g_0)) \cos(g_0) \log(\sin(g_0))^2 \sin(g_0)}{2}$$

$$\frac{\log(\sin(g_0))^2 \sin(g_0)^2}{2}$$

$$\arcsin(\sin(g_0))^2 \log(\sin(g_0)) \sin(g_0)^2$$

$$\arcsin(\sin(g_0)) \log(\sin(g_0)) \sin(g_0)^2 g_0$$

$$\log(\sin(g_0)) \sin(g_0)^2$$

$$\cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0$$

$$\arcsin\left(\sin(g_0)\right)^2 \cos(g_0)^2$$

$$\arcsin\left(\sin(g_0)\right) \cos(g_0) \sin(g_0)$$

$$\arcsin\left(\sin(g_0)\right) \cos(g_0)^2 g_0$$

$$\cos(g_0)$$

*** Introduce new constants for coefficients

***** U(2 1 0 1 1) =

!!c5

Introduced terms: (2 1 2 0 1)*(

$$- !c_5$$

)
 Introduced terms: (2 1 1 1 0)*(

$$!c_5$$

)
 Introduced terms: (2 0 1 1 1)*(

$$!c_5$$

)
 Introduced terms: (1 1 0 2 1)*(

$$2 !c_5$$

Constant map changed to (!!c5 . 5) (!!c2 . 4) (!!c3 . 3) (!!c4 . 2) (!!c1 . 1))

A coefficient of numerator has been determined

***** U(2 2 0 1 0) =

$$\frac{!c_2 + !c_3 + 2!c_4 - 2!c_5 - 1}{4}$$

Terms remaining are:

$$\frac{\arcsin\left(\sin(g_0)\right)^2 \log\left(\sin(g_0)\right)^2 \sin(g_0)^2}{4}$$

$$\arcsin\left(\sin(g_0)\right) \log\left(\sin(g_0)\right)^2 \sin(g_0)^2 g_0$$

$$\frac{\log(\sin(g_0))^2 \sin(g_0)^2}{2}$$

$$\cos(g_0) \log(\sin(g_0))^2 \sin(g_0) g_0$$

$$\arcsin(\sin(g_0))^2 \log(\sin(g_0)) \sin(g_0)^2$$

$$\frac{\arcsin(\sin(g_0))^2 \cos(g_0)^2 \log(\sin(g_0))}{2}$$

$$\arcsin(\sin(g_0)) \log(\sin(g_0)) \sin(g_0)^2 g_0$$

$$\arcsin(\sin(g_0)) \cos(g_0)^2 \log(\sin(g_0)) g_0$$

$$\log(\sin(g_0)) \sin(g_0)^2$$

$$\cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0$$

$$\arcsin(\sin(g_0))^2 \cos(g_0)^2$$

$$\arcsin(\sin(g_0)) \cos(g_0) \sin(g_0)$$

$$\arcsin(\sin(g_0)) \cos(g_0)^2 g_0$$

$$\cos(g_0)$$

A coefficient of numerator has been determined

***** U(2 2 1 0 1) =

$$\frac{!c_2 + !c_3 + 2 !c_4 - 2 !c_5 - 1}{4}$$

Terms remaining are:

$$\frac{\arcsin\left(\sin(g_0)\right)^2 \cos(g_0) \log\left(\sin(g_0)\right)^2 \sin(g_0) g_0}{4}$$

$$\frac{\arcsin\left(\sin(g_0)\right) \log\left(\sin(g_0)\right)^2 \sin(g_0)^2 g_0}{2}$$

$$\frac{\log\left(\sin(g_0)\right)^2 \sin(g_0)^2}{2}$$

$$\cos(g_0) \log\left(\sin(g_0)\right)^2 \sin(g_0) g_0$$

$$\arcsin\left(\sin(g_0)\right)^2 \log\left(\sin(g_0)\right) \sin(g_0)^2$$

$$\frac{\arcsin\left(\sin(g_0)\right)^2 \cos(g_0) \log\left(\sin(g_0)\right) \sin(g_0) g_0}{2}$$

$$\frac{\arcsin\left(\sin(g_0)\right)^2 \cos(g_0)^2 \log\left(\sin(g_0)\right)}{2}$$

$$\arcsin\left(\sin(g_0)\right) \log\left(\sin(g_0)\right) \sin(g_0)^2 g_0$$

$$\arcsin\left(\sin(g_0)\right) \cos(g_0)^2 \log\left(\sin(g_0)\right) g_0$$

$$\log\left(\sin(g_0)\right) \sin(g_0)^2$$

$$\cos(g_0) \log\left(\sin(g_0)\right) \sin(g_0) g_0$$

$$\arcsin\left(\sin(g_0)\right)^2 \cos(g_0)^2$$

$$\arcsin(\sin(g_0)) \cos(g_0) \sin(g_0)$$

$$\arcsin(\sin(g_0)) \cos(g_0)^2 g_0$$

$$\cos(g_0)$$

***** Equation for a constant to be solved:
= 0

Replace constant !c4 by

$$\frac{-!c_2 - !c_3 + 2 !c_5 + 1}{2}$$

Terms remaining are:

$$\frac{\arcsin(\sin(g_0)) \log(\sin(g_0))^2 \sin(g_0)^2 g_0}{2}$$

$$\frac{\log(\sin(g_0))^2 \sin(g_0)^2}{2}$$

$$\cos(g_0) \log(\sin(g_0))^2 \sin(g_0) g_0$$

$$\frac{\arcsin(\sin(g_0))^2 \log(\sin(g_0)) \sin(g_0)^2}{2}$$

$$\arcsin(\sin(g_0)) \log(\sin(g_0)) \sin(g_0)^2 g_0$$

$$\arcsin(\sin(g_0)) \cos(g_0)^2 \log(\sin(g_0)) g_0$$

$$\log(\sin(g_0)) \sin(g_0)^2$$

$$\cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0$$

$$\frac{\arcsin\left(\sin\left(g_0\right)\right)^2 \cos\left(g_0\right)^2}{2}$$

$$\arcsin\left(\sin\left(g_0\right)\right) \cos\left(g_0\right) \sin\left(g_0\right)$$

$$\frac{\arcsin\left(\sin\left(g_0\right)\right) \cos\left(g_0\right)^2 g_0}{\cos\left(g_0\right)}$$

***** Equation for a constant to be solved:

= 0

Replace constant !c5 by

0

Terms remaining are:

$$\frac{\arcsin\left(\sin\left(g_0\right)\right)^2 \log\left(\sin\left(g_0\right)\right) \sin\left(g_0\right)^2}{2}$$

$$\arcsin\left(\sin\left(g_0\right)\right) \log\left(\sin\left(g_0\right)\right) \sin\left(g_0\right)^2 g_0$$

$$\log\left(\sin\left(g_0\right)\right) \sin\left(g_0\right)^2$$

$$\cos\left(g_0\right) \log\left(\sin\left(g_0\right)\right) \sin\left(g_0\right) g_0$$

$$\frac{\arcsin\left(\sin\left(g_0\right)\right)^2 \cos\left(g_0\right)^2}{2}$$

$$\arcsin\left(\sin\left(g_0\right)\right) \cos\left(g_0\right) \sin\left(g_0\right)$$

$$\arcsin\left(\sin\left(g_0\right)\right) \cos\left(g_0\right)^2 g_0$$

$$\cos(g_0)$$

A coefficient of numerator has been determined

***** U(1 2 1 0 1) =

$$\frac{-!c_2 - !c_2 + 1}{2}$$

Terms remaining are:

$$\frac{\arcsin(\sin(g_0))^2 \cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0}{2}$$

$$\arcsin(\sin(g_0)) \log(\sin(g_0)) \sin(g_0)^2 g_0$$

$$\log(\sin(g_0)) \sin(g_0)^2$$

$$\cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0$$

$$\frac{\arcsin(\sin(g_0))^2 \cos(g_0) \sin(g_0) g_0}{2}$$

$$\frac{\arcsin(\sin(g_0))^2 \cos(g_0)^2}{2}$$

$$\arcsin(\sin(g_0)) \cos(g_0) \sin(g_0)$$

$$\arcsin(\sin(g_0)) \cos(g_0)^2 g_0$$

$$\cos(g_0)$$

***** Equation for a constant to be solved:

= 0

Replace constant !c3 by

$$-!c_2 + 1$$

Terms remaining are:

$$\arcsin(\sin(g_0)) \log(\sin(g_0)) \sin(g_0)^2 g_0$$

$$\begin{aligned} & \log(\sin(g_0)) \sin(g_0)^2 \\ & \cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0 \\ & \arcsin(\sin(g_0)) \cos(g_0) \sin(g_0) \\ & \arcsin(\sin(g_0)) \cos(g_0)^2 g_0 \\ & \cos(g_0) \end{aligned}$$

***** Equation for a constant to be solved:
= 0

Replace constant !c2 by

0

Terms remaining are:

$$\begin{aligned} & \log(\sin(g_0)) \sin(g_0)^2 \\ & \arcsin(\sin(g_0)) \cos(g_0) \sin(g_0) \\ & \cos(g_0) \end{aligned}$$

*** Introduce new constants for coefficients

***** U(1 0 0 1 0) =

!!c6

Introduced terms: (1 0 2 0 0)*(

$$- !c_6$$

)
 Introduced terms: (0 0 0 2 0)*(

$$!c_6$$

)
 Constant map changed to ((!!c6 . 6) (!!c5 . 5) (!!c2 . 4) (!!c3 . 3) (!!c4 . 2)
 (!!c1 . 1))

A coefficient of numerator has been determined

***** U(1 0 1 0 1) =

$$!c_6 - 1$$

Terms remaining are:

$$\cos(g_0) \log(\sin(g_0)) \sin(g_0) g_0$$

$$\begin{aligned} & \arcsin\left(\sin(g_0)\right) \cos(g_0) \sin(g_0) \\ & \cos(g_0) \sin(g_0) g_0 \\ & \cos(g_0)^2 \\ & \cos(g_0) \end{aligned}$$

***** Equation for a constant to be solved:
= 0

Replace constant !c6 by

$$1$$

Terms remaining are:

$$\begin{aligned} & \arcsin\left(\sin(g_0)\right) \cos(g_0) \sin(g_0) \\ & \cos(g_0)^2 \\ & \cos(g_0) \end{aligned}$$

Maximum order for undetermined coefficients is reduced to (1 2 2 2 1)

*** Introduce new constants for coefficients

***** U(0 1 0 1 1) =
!!c7

***** U(0 1 1 0 0) =
!!c8

Introduced terms: (0 1 2 0 1)*(

$$-!c_7$$

)
Introduced terms: (0 1 1 1 0)*(

$$!c_7 + !c_8$$

)
Introduced terms: (0 0 2 0 0)*(

$$!c_8$$

)
Introduced terms: (0 0 1 1 1)*(

$$!c_7$$

Constant map changed to (!!c8 . 7) (!!c6 . 6) (!!c5 . 5) (!!c2 . 4) (!!c3 . 3)
 (!!c4 . 2) (!!c1 . 1)

Constant map changed to (!!c7 . 8) (!!c8 . 7) (!!c6 . 6) (!!c5 . 5) (!!c2 . 4)

```
(!!c3 . 3) (!!c4 . 2) (!!c1 . 1))
```

A coefficient of numerator has been determined
 ***** U(0 2 0 1 0) =

$$\frac{-(lc_7 + lc_8 + 1)}{2}$$

Terms remaining are:

$$\frac{\arcsin(\sin(g_0))^2 \sin(g_0)^2}{2}$$

$$\frac{\arcsin(\sin(g_0)) \sin(g_0)^2 g_0}{\sin(g_0)^2}$$

$$\frac{\cos(g_0) \sin(g_0) g_0}{\cos(g_0)^2}$$

$$\cos(g_0)$$

A coefficient of numerator has been determined

***** U(0 2 1 0 1) =

$$\frac{-(lc_7 + lc_8 + 1)}{2}$$

Terms remaining are:

$$\frac{\arcsin(\sin(g_0))^2 \cos(g_0) \sin(g_0) g_0}{2}$$

$$\frac{\arcsin(\sin(g_0)) \sin(g_0)^2 g_0}{\sin(g_0)^2}$$

$$\frac{\cos(g_0) \sin(g_0) g_0}{\cos(g_0)^2}$$

$$\cos(g_0)$$

***** Equation for a constant to be solved:
= 0

Replace constant !c8 by

$$-(!c_7 + 1)$$

Terms remaining are:

$$\arcsin(\sin(g_0)) \sin(g_0)^2 g_0$$

$$\sin(g_0)^2$$

$$\cos(g_0) \sin(g_0) g_0$$

$$\cos(g_0)^2$$

$$\cos(g_0)$$

***** Equation for a constant to be solved:
= 0

Replace constant !c7 by

$$0$$

Terms remaining are:

$$\sin(g_0)^2$$

$$\cos(g_0)^2$$

$$\cos(g_0)$$

Maximum order for undetermined coefficients is reduced to (1 1 2 2 1)

*** Introduce new constants for coefficients

***** U(0 0 0 1 0) =

!!c9

Introduced terms: (0 0 2 0 0)*(

)

$$- !c_9$$

Constant map changed to (!!c9 . 9) (!!c7 . 8) (!!c8 . 7) (!!c6 . 6) (!!c5 . 5)
 (!!c2 . 4) (!!c3 . 3) (!!c4 . 2) (!!c1 . 1)

A coefficient of numerator has been determined

***** U(0 0 1 0 1) =

$$!c_9 + 1$$

Terms remaining are:

$$\cos(g_0) \sin(g_0) g_0$$

$$\cos(g_0)^2$$

$$\cos(g_0)$$

***** Equation for a constant to be solved:

= 0

Replace constant !c9 by

$$- 1$$

Terms remaining are:

$$\cos(g_0)^2$$

$$\cos(g_0)$$

Maximum order for undetermined coefficients is reduced to (1 1 1 2 1)

***** Equation for a constant to be solved:

= 0

Inconsistency in equations for constants,
so non integrable

A coefficient of numerator has been determined

***** U(1 0 0 0 0) =

$$- !c_1$$

Terms remaining are:

***** THE INTEGRAL IS : *****

$$\arcsin(\sin(g_0)) \log(\sin(g_0)) \sin(g_0) - \arcsin(\sin(g_0)) \sin(g_0) + \cos(g_0) \log(\sin(g_0)) - \cos(g_0)$$

plus a part which has not been integrated

Went wrong way

Resetting....

Applying transformations ...

Applying transformations ...

$$\arcsin\left(\sin(g_0)\right) \cos(g_0) \log\left(\sin(g_0)\right)$$

Start of Integration; integrand is

$$\frac{\arcsin\left(\frac{2 \tan\left(\frac{g_0}{2}\right)}{\tan\left(\frac{g_0}{2}\right)^2 + 1}\right) \log\left(\frac{2 \tan\left(\frac{g_0}{2}\right)}{\tan\left(\frac{g_0}{2}\right)^2 + 1}\right) \left(-\tan\left(\frac{g_0}{2}\right)^2 + 1\right)}{\tan\left(\frac{g_0}{2}\right)^2 + 1}$$

Determination of the differential field descriptor
gives the functions:

```
((asin (quotient (times 2 (tan (quotient g0 2))) (plus (expt (tan (quotient g0 2)) 2) 1))) (log (quotient (times 2 (tan (quotient g0 2))) (plus (expt (tan (quotient g0 2)) 2) 1))) (tan (quotient g0 2)) g0)
```

Transforming back...

0

plus a bad part of

$$\arcsin(x) \log(x)$$
$$\int \arcsin(x) \log(x) dx$$