

Ten Hard Integrals

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Introduction

These are first 10 integrals from Kevin Charlwood’s 2008 article "Integration on Computer Algebra Systems" solved using different CAS systems.

The original post on this topic is sci.math.symbolic by Martin

These are the CAS systems used

1. Maple 2020 on windows 10 (64 bit)
2. Mathematica 12.1 on windows 10
3. Rubi 4.16.1
4. Maxima 5.43.2 on Linux
5. FriCAS 1.3.6 on Linux
6. Sympy 1.5 under Python 3.7.3 using Anaconda distribution.
7. mupad engine in Matlab 2016a symbolic toolbox
8. Giac/Xcas 1.5.0.87-1 on Linux.

Summary of result

The following is summary of results for each integral. Result with a () around it means the antiderivative contains either a complex number on non-elementary function.

system	1	2	3	4	5	6	7	8	9	10	score
FriCAS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100%
Maple	✓	✓	✓	✓	(✓)	✓	✓	✓	✓	✓	100%
Mathematica	✓	✓	✓	✓	(✓)	✓	✓	(✓)	(✓)	✓	100%
Rubi	✓	✓	✗	✓	(✓)	✓	✓	✓	✓	✓	90%
xCas	✓	✓	✗	✓	✗	✓	✓	(✓)	✓	✓	80%
Maxima	✓	✓	✗	✗	✗	✗	✓	✗	✓	✗	40%
Sympy	✓	✓	✗	✗	✗	✗	✗	✗	✗	✓	30%
mupad 2016a	✗	✗	✗	✓	✗	✗	✗	✗	✓	✗	20%

Downloads, references and links

1. copy of Kevin Charlwood’s 2008 paper in PDF
2. `CharlwoodIntegrationProblems.pdf` PDF file showing the 50 integrals and the best antiderivatives expected to each. By Albert Rich.

Integrals

Local contents

2.1	$\int \arcsin(x) \ln(x) \, dx$	5
2.2	$\int \frac{x \arcsin(x)}{\sqrt{1-x^2}} \, dx$	7
2.3	$\int -\sin^{-1}(\sqrt{x} - \sqrt{x+1}) \, dx$	8
2.4	$\int \log(\sqrt{x^2+1}x+1) \, dx$	11
2.5	$\int \frac{\cos^2(x)}{\sqrt{\cos^4(x)+\cos^2(x)+1}} \, dx$	14
2.6	$\int \tan(x) \sqrt{\tan^4(x)+1} \, dx$	16
2.7	$\int \frac{\tan(x)}{\sqrt{\sec^3(x)+1}} \, dx$	18
2.8	$\int \sqrt{\tan^2(x)+2\tan(x)+2} \, dx$	20
2.9	$\int \sin(x) \tan^{-1}(\sqrt{\sec(x)-1}) \, dx$	22
2.10	$\int \frac{x^3 e^{\sin^{-1}(x)}}{\sqrt{1-x^2}} \, dx$	24

2.1 $\int \arcsin(x) \ln(x) \, dx$

2.1.1 Mathematica

```
Clear[x]
Integrate[ArcSin[x] Log[x], x]
```

$$-2\sqrt{1-x^2} + \left(\sqrt{1-x^2} - 1\right) \log(x) + \log\left(\sqrt{1-x^2} + 1\right) + x(\log(x) - 1) \sin^{-1}(x)$$

2.1.2 Rubi

```
<< Rubi`
Clear[x]
Int[ArcSin[x] Log[x], x]
```

$$-2\sqrt{1-x^2} + \sqrt{1-x^2} \log(x) + \tanh^{-1}\left(\sqrt{1-x^2}\right) - x \sin^{-1}(x) + x \log(x) \sin^{-1}(x)$$

2.1.3 Maple

```
restart;
int(arcsin(x)*log(x),x);
```

$$2 \frac{1}{1 + (\tan(1/2 \arcsin(x)))^2} \left(\arcsin(x) \tan(1/2 \arcsin(x)) \ln \left(2 \frac{\tan(1/2 \arcsin(x))}{1 + (\tan(1/2 \arcsin(x)))^2} \right) - (\tan(1/2 \arcsin(x)))^2 \right) - \ln \left(1 + \left(\tan \left(\frac{\arcsin(x)}{2} \right) \right)^2 \right)$$

2.1.4 Fricas

```
setSimplifyDenomsFlag(true)
ii:=integrate(asin(x)*log(x),x);
latex(ii)
```

$$\frac{\log(\sqrt{-x^2+1}+1) - \log(\sqrt{-x^2+1}-1) + (2 \log(x) - 4) \sqrt{-x^2+1} + 2 x \arcsin(x) \log(x) - 2 x \arcsin(x)}{2}$$

2.1.5 Maxima

```
ii : integrate(asin(x)*log(x),x);
tex(ii);
```

$$\log \left(\frac{2\sqrt{1-x^2}}{|x|} + \frac{2}{|x|} \right) + \arcsin x (x \log x - x) + \sqrt{1-x^2} \log x - 2\sqrt{1-x^2}$$

2.1.6 XCAS

```
ii := integrate(asin(x)*log(x),x);
latex(ii);
```

$$\begin{aligned} & \sqrt{-x^2+1} \ln x + \frac{2 \ln(\sqrt{-x^2+1}+1)}{2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2} - \frac{2 \ln|x|}{2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2} \\ & + x \arcsin x \cdot \ln x - \frac{4x \arcsin x}{(\sqrt{-x^2+1}+1) \left(2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2 \right)} \\ & + \frac{4x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2}{2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2} + \frac{2x^2 \ln(\sqrt{-x^2+1}+1) \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2}{2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2} \\ & - \frac{2x^2 \ln|x| \cdot \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2}{2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2} - \frac{4}{2x^2 \left(\frac{1}{\sqrt{-x^2+1}+1} \right)^2 + 2} \end{aligned}$$

2.1.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> from sympy import *
>>> x = symbols('x')
>>> ii = integrate(asin(x)*log(x),x)
>>> latex(ii)
```

$$x \log(x) \operatorname{asin}(x) - x \operatorname{asin}(x) + \sqrt{1-x^2} \log(x) - \sqrt{1-x^2} \\ - \begin{cases} -\frac{x}{\sqrt{-1+\frac{1}{x^2}}} - \operatorname{acosh}\left(\frac{1}{x}\right) + \frac{1}{x\sqrt{-1+\frac{1}{x^2}}} & \text{for } \frac{1}{|x^2|} > 1 \\ \frac{ix}{\sqrt{1-\frac{1}{x^2}}} + i \operatorname{asin}\left(\frac{1}{x}\right) - \frac{i}{x\sqrt{1-\frac{1}{x^2}}} & \text{otherwise} \end{cases}$$

2.1.8 MuPad

```
evalin(symengine,'int(asin(x)*log(x),x)')
```

did not solve

2.2 $\int \frac{x \arcsin(x)}{\sqrt{1-x^2}} dx$

2.2.1 Mathematica

```
Clear[x]
Integrate[(x ArcSin[x])/Sqrt[1 - x^2], x]
```

$$x - \sqrt{1-x^2} \sin^{-1}(x)$$

2.2.2 Rubi

```
<< Rubi`
Clear[x]
Int[(x ArcSin[x])/Sqrt[1 - x^2], x]
```

$$x - \sqrt{1-x^2} \sin^{-1}(x)$$

2.2.3 Maple

```
restart;
integrand:=x*arcsin(x)/sqrt(1-x^2);
int(integrand,x);
latex(%)
```

$$x - \arcsin(x) \sqrt{-x^2 + 1}$$

2.2.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
ii:=integrate(x*asin(x)/sqrt(1-x^2),x)
latex(ii)
```

$$-\arcsin(x) \sqrt{-x^2 + 1} + x$$

2.2.5 Maxima

```
ii : integrate(x*asin(x)/sqrt(1-x^2),x);
tex(ii);
```

$$x - \sqrt{1 - x^2} \arcsin x$$

2.2.6 XCAS

```
ii := integrate(x*asin(x)/sqrt(1-x^2),x);
latex(ii)
```

$$-\sqrt{-x^2 + 1} \arcsin x + x$$

2.2.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
ii=integrate(x*asin(x)/sqrt(1-x**2),x)
latex(ii)
```

$$x - \sqrt{1 - x^2} \arcsin(x)$$

2.2.8 MuPad

```
evalin(symengine,'int(x*asin(x)/sqrt(1-x^2),x)')
```

did not solve

2.3 $\int -\sin^{-1}(\sqrt{x} - \sqrt{x+1}) \, dx$

2.3.1 Mathematica

```
ClearAll[x]
integrand = ArcSin[Sqrt[x + 1] - Sqrt[x]];
res = Integrate[integrand, x];
TeXForm[res]
```

$$\frac{(x+1)\left(2x-2\sqrt{x+1}\sqrt{x}+1\right)^2\left(2\sqrt{\sqrt{x}\sqrt{x+1}}-x\left(-2x+2\sqrt{x+1}\sqrt{x}-3\right)+3\sqrt{-4x+4\sqrt{x+1}\sqrt{x}}-8\sqrt{2}\left(\sqrt{x+1}-\sqrt{x}\right)^3\left(x-\sqrt{x+1}\sqrt{x}+1\right)^2\right)}{-x\sin^{-1}\left(\sqrt{x}-\sqrt{x+1}\right)}$$

2.3.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = ArcSin[Sqrt[x + 1] - Sqrt[x]];
res = Int[integrand, x];
TeXForm[res]
```

$$\frac{\text{Subst}\left(\text{Int}\left(\sqrt{-x^2+\sqrt{x^2-1}x+1},x\right),x,\sqrt{x+1}\right)}{\sqrt{2}}-x\sin^{-1}\left(\sqrt{x}-\sqrt{x+1}\right)$$

2.3.3 Maple

```
restart;
integrand:=arcsin(sqrt(x+1)-sqrt(x));
res:=int(integrand,x);
latex(res)
```

$$-\frac{1}{16}\left(\arcsin\left(-\sqrt{x+1}+\sqrt{x}\right)\left(\tan\left(\frac{1}{2}\arcsin\left(-\sqrt{x+1}+\sqrt{x}\right)\right)\right)^8+2\arcsin\left(-\sqrt{x+1}+\sqrt{x}\right)\left(\tan\left(1\right)\right)\right)$$

2.3.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
ii:=integrate(asin(sqrt(x+1)-sqrt(x)),x)
latex(ii)
```

$$\frac{\left(3\sqrt{x+1}+\sqrt{x}\right)\sqrt{2\sqrt{x}\sqrt{x+1}-2x}+\left(8x+3\right)\arcsin\left(\sqrt{x+1}-\sqrt{x}\right)}{8}$$

2.3.5 Maxima

```
ii : integrate(asin(sqrt(x+1)-sqrt(x)),x);
tex(ii);
```

This result is wrong. bug.

$$\frac{\pi x}{2}$$

2.3.6 XCAS

```
ii := integrate(asin(sqrt(x+1)-sqrt(x)),x);

Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [92.1017843988]
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [53.1277311612]
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [5.38357630698]
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [6.79369851155]
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [84.3561567818]
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [77.6493344628]
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [72.519035968]
Warning, need to choose a branch for the root of a polynomial with parameters.
This might be wrong.
The choice was done assuming [t_nostep]=[0]
Warning, need to choose a branch for the root of a polynomial with parameters.
This might be wrong.
The choice was done assuming [t_nostep]=[0]
Algebraic extensions not allowed in a rootof
Algebraic extensions not allowed in a rootof
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters
values [69.9232513234]

latex(ii)
```

did not solve

2.3.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
ii=integrate(asin(sqrt(x+1)-sqrt(x)),x);
latex(ii)
```

did not solve

2.3.8 MuPad

```
evalin(symengine,'int(asin(sqrt(x+1)-sqrt(x)),x)')
```

did not solve

2.4 $\int \log \left(\sqrt{x^2 + 1}x + 1 \right) dx$

2.4.1 Mathematica

```
ClearAll[x]
integrand = Log[1 + x Sqrt[1 + x^2]];
res = Integrate[integrand, x];
TeXForm[res]
```

$$\begin{aligned} & x \log \left(\sqrt{x^2 + 1}x + 1 \right) - \frac{\sqrt{2(\sqrt{5} - 1)} \tan^{-1} \left(\sqrt{\frac{2}{\sqrt{5} - 1}} \sqrt{x^2 + 1} \right)}{1 - \sqrt{5}} \\ & - \sqrt{\frac{2}{1 + \sqrt{5}}} \tanh^{-1} \left(\sqrt{\frac{2}{1 + \sqrt{5}}} \sqrt{x^2 + 1} \right) - 2x \\ & + \frac{(5 + \sqrt{5}) \tan^{-1} \left(\sqrt{\frac{2}{1 + \sqrt{5}}} x \right)}{\sqrt{10(1 + \sqrt{5})}} - \frac{(\sqrt{5} - 5) \tanh^{-1} \left(\sqrt{\frac{2}{\sqrt{5} - 1}} x \right)}{\sqrt{10(\sqrt{5} - 1)}} \end{aligned}$$

2.4.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = Log[1 + x Sqrt[1 + x^2]]
res = Int[integrand, x];
TeXForm[res]
```

$$\begin{aligned} & x \log \left(\sqrt{x^2 + 1}x + 1 \right) + \sqrt{\frac{2}{5}} (\sqrt{5} - 1) \tan^{-1} \left(\sqrt{\frac{2}{\sqrt{5} - 1}} \sqrt{x^2 + 1} \right) \\ & + \sqrt{\frac{2}{5(\sqrt{5} - 1)}} \tan^{-1} \left(\sqrt{\frac{2}{\sqrt{5} - 1}} \sqrt{x^2 + 1} \right) \\ & - \sqrt{\frac{2}{5}} (1 + \sqrt{5}) \tanh^{-1} \left(\sqrt{\frac{2}{1 + \sqrt{5}}} \sqrt{x^2 + 1} \right) \\ & + \sqrt{\frac{2}{5(1 + \sqrt{5})}} \tanh^{-1} \left(\sqrt{\frac{2}{1 + \sqrt{5}}} \sqrt{x^2 + 1} \right) - 2x \\ & + 2\sqrt{\frac{1}{5}} (2 + \sqrt{5}) \tan^{-1} \left(\sqrt{\frac{2}{1 + \sqrt{5}}} x \right) - \sqrt{\frac{1}{10}} (1 + \sqrt{5}) \tan^{-1} \left(\sqrt{\frac{2}{1 + \sqrt{5}}} x \right) \\ & + \sqrt{\frac{1}{10}} (\sqrt{5} - 1) \tanh^{-1} \left(\sqrt{\frac{2}{\sqrt{5} - 1}} x \right) + 2\sqrt{\frac{1}{5}} (\sqrt{5} - 2) \tanh^{-1} \left(\sqrt{\frac{2}{\sqrt{5} - 1}} x \right) \end{aligned}$$

2.4.3 Maple

```
restart;
integrand:=ln(1 + x*sqrt(1 + x^2));
res:=int(integrand,x);
latex(res)
```

$$\begin{aligned}
& \ln \left(1 + x\sqrt{x^2 + 1} \right) x + \frac{1}{\sqrt{2\sqrt{5} + 2}} \arctan \left(2 \frac{x}{\sqrt{2\sqrt{5} + 2}} \right) \\
& + \frac{\sqrt{5}}{\sqrt{2\sqrt{5} + 2}} \arctan \left(2 \frac{x}{\sqrt{2\sqrt{5} + 2}} \right) \\
& - \frac{1}{\sqrt{-2 + 2\sqrt{5}}} \operatorname{arctanh} \left(2 \frac{x}{\sqrt{-2 + 2\sqrt{5}}} \right) \\
& + \frac{\sqrt{5}}{\sqrt{-2 + 2\sqrt{5}}} \operatorname{arctanh} \left(2 \frac{x}{\sqrt{-2 + 2\sqrt{5}}} \right) - 2x \\
& - \frac{3\sqrt{5}}{10\sqrt{2 + \sqrt{5}}} \arctan \left(\frac{1}{\sqrt{2 + \sqrt{5}}} (\sqrt{x^2 + 1} - x) \right) \\
& - \frac{1}{2\sqrt{2 + \sqrt{5}}} \arctan \left(\frac{1}{\sqrt{2 + \sqrt{5}}} (\sqrt{x^2 + 1} - x) \right) \\
& - \frac{3\sqrt{5}}{10\sqrt{\sqrt{5} - 2}} \operatorname{arctanh} \left(\frac{1}{\sqrt{\sqrt{5} - 2}} (\sqrt{x^2 + 1} - x) \right) \\
& + \frac{1}{2\sqrt{\sqrt{5} - 2}} \operatorname{arctanh} \left(\frac{1}{\sqrt{\sqrt{5} - 2}} (\sqrt{x^2 + 1} - x) \right) \\
& - \frac{1}{2\sqrt{2 + \sqrt{5}}} \operatorname{arctanh} \left(\frac{1}{\sqrt{2 + \sqrt{5}}} (\sqrt{x^2 + 1} - x) \right) \\
& - \frac{\sqrt{5}}{2\sqrt{2 + \sqrt{5}}} \operatorname{arctanh} \left(\frac{1}{\sqrt{2 + \sqrt{5}}} (\sqrt{x^2 + 1} - x) \right) \\
& + \frac{1}{2\sqrt{\sqrt{5} - 2}} \arctan \left(\frac{1}{\sqrt{\sqrt{5} - 2}} (\sqrt{x^2 + 1} - x) \right) \\
& - \frac{\sqrt{5}}{2\sqrt{\sqrt{5} - 2}} \arctan \left(\frac{1}{\sqrt{\sqrt{5} - 2}} (\sqrt{x^2 + 1} - x) \right) \\
& + \frac{2\sqrt{2 + \sqrt{5}}\sqrt{5}}{5} \arctan \left(\frac{1}{\sqrt{2 + \sqrt{5}}} (\sqrt{x^2 + 1} - x) \right) \\
& - \frac{2\sqrt{\sqrt{5} - 2}\sqrt{5}}{5} \operatorname{arctanh} \left(\frac{1}{\sqrt{\sqrt{5} - 2}} (\sqrt{x^2 + 1} - x) \right)
\end{aligned}$$

2.4.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
integrand := log(1 + x*sqrt(1 + x^2));
ii:=integrate(integrand,x);
latex(ii)
```

$$-4\sqrt{2}\sqrt{\sqrt{5}+1}\arctan\left(\frac{\left(\sqrt{2}\sqrt{x^2+1}+x\sqrt{2}\right)\sqrt{\sqrt{5}+1}\sqrt{\left(-16x\sqrt{5}-32x^3-16x\right)\sqrt{x^2+1}+(16x^2+8)\sqrt{5}+32x^4+32x^2+8-4}}{8}\right)$$

2.4.5 Maxima

```
integrand : log(1 + x*sqrt(1 + x^2));
ii : integrate(integrand,x);
latex(ii)
```

did not solve

2.4.6 XCAS

```
integrand := log(1 + x*sqrt(1 + x^2));
ii := integrate(integrand,x);
latex(ii)
```

$$\begin{aligned}
& -\frac{1}{4}\sqrt{2(\sqrt{5}-1)}\ln\left|x-\sqrt{\frac{-1+\sqrt{5}}{2}}\right|+\frac{1}{4}\sqrt{2(\sqrt{5}-1)}\ln\left|x+\sqrt{\frac{-1+\sqrt{5}}{2}}\right| \\
& +\frac{1}{2}\sqrt{2(\sqrt{5}+1)}\arctan\left(\frac{x}{\sqrt{\frac{-1-\sqrt{5}}{2}}}\right)-2x \\
& -2\left(-\frac{1}{8}\sqrt{2(\sqrt{5}-1)}\ln\left|\sqrt{x^2+1}-x+\frac{1}{\sqrt{x^2+1}-x}-\sqrt{\frac{4+4\sqrt{5}}{2}}\right|\right. \\
& \left.+\frac{1}{8}\sqrt{2(\sqrt{5}-1)}\ln\left(\sqrt{x^2+1}-x+\frac{1}{\sqrt{x^2+1}-x}+\sqrt{\frac{4+4\sqrt{5}}{2}}\right)\right. \\
& \left.-\frac{1}{4}\sqrt{2(\sqrt{5}+1)}\arctan\left(\frac{\sqrt{x^2+1}-x+\frac{1}{\sqrt{x^2+1}-x}}{\sqrt{\frac{4-4\sqrt{5}}{2}}}\right)\right)+x\ln(1+x\sqrt{1+x^2})
\end{aligned}$$

2.4.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = log(1 + x*sqrt(1 + x**2));
ii = integrate(integrand,x);
latex(ii)
```

did not solve

2.4.8 MuPad

```
evalin(symengine,'int(log(1 + x*sqrt(1 + x^2)),x)')
```

$$\begin{aligned} &\ln\left(1+x\sqrt{x^2+1}\right)x-2x+\frac{\frac{\sqrt{5}}{2}-\frac{5}{2}}{2\sqrt{1/2\sqrt{5}-1/2+4\left(1/2\sqrt{5}-1/2\right)^{3/2}}}\ln\left(x-\frac{\sqrt{2}\sqrt{\sqrt{5}-1}}{2}\right) \\ &- \frac{\frac{\sqrt{5}}{2}-\frac{5}{2}}{2\sqrt{1/2\sqrt{5}-1/2+4\left(1/2\sqrt{5}-1/2\right)^{3/2}}}\ln\left(x+\frac{\sqrt{2}\sqrt{\sqrt{5}-1}}{2}\right) \\ &- \frac{\frac{\sqrt{5}}{2}+\frac{5}{2}}{2\sqrt{-1/2\sqrt{5}-1/2+4\left(-1/2\sqrt{5}-1/2\right)^{3/2}}}\ln\left(x-\frac{\sqrt{2}\sqrt{-\sqrt{5}-1}}{2}\right) \\ &+ \frac{\frac{\sqrt{5}}{2}+\frac{5}{2}}{2\sqrt{-1/2\sqrt{5}-1/2+4\left(-1/2\sqrt{5}-1/2\right)^{3/2}}}\ln\left(x+\frac{\sqrt{2}\sqrt{-\sqrt{5}-1}}{2}\right) \\ &+ \frac{\sqrt{\frac{\sqrt{5}}{2}-\frac{1}{2}}+2\left(1/2\sqrt{5}-1/2\right)^{3/2}}{\left(2\sqrt{1/2\sqrt{5}-1/2+4\left(1/2\sqrt{5}-1/2\right)^{3/2}}\right)\sqrt{\frac{\sqrt{5}}{2}+\frac{1}{2}}}\left(\ln\left(x-\frac{\sqrt{2}\sqrt{\sqrt{5}-1}}{2}\right)-\ln\left(\frac{\sqrt{2}x\sqrt{\sqrt{5}-1}}{2}+\sqrt{x^2+1}\right)\right) \\ &+ \frac{\sqrt{\frac{\sqrt{5}}{2}-\frac{1}{2}}+2\left(1/2\sqrt{5}-1/2\right)^{3/2}}{\left(2\sqrt{1/2\sqrt{5}-1/2+4\left(1/2\sqrt{5}-1/2\right)^{3/2}}\right)\sqrt{\frac{\sqrt{5}}{2}+\frac{1}{2}}}\left(\ln\left(x+\frac{\sqrt{2}\sqrt{\sqrt{5}-1}}{2}\right)-\ln\left(\frac{\sqrt{2}\sqrt{\sqrt{5}+1}}{2}\sqrt{x^2+1}\right)\right) \\ &- \frac{\sqrt{-\frac{\sqrt{5}}{2}-\frac{1}{2}}+2\left(-1/2\sqrt{5}-1/2\right)^{3/2}}{\left(2\sqrt{-1/2\sqrt{5}-1/2+4\left(-1/2\sqrt{5}-1/2\right)^{3/2}}\right)\sqrt{\frac{1}{2}-\frac{\sqrt{5}}{2}}}\left(\ln\left(\frac{\sqrt{2}\sqrt{-\sqrt{5}+1}}{2}\sqrt{x^2+1}-\frac{\sqrt{2}x\sqrt{-\sqrt{5}-1}}{2}\right)\right) \\ &- \frac{\sqrt{-\frac{\sqrt{5}}{2}-\frac{1}{2}}+2\left(-1/2\sqrt{5}-1/2\right)^{3/2}}{\left(2\sqrt{-1/2\sqrt{5}-1/2+4\left(-1/2\sqrt{5}-1/2\right)^{3/2}}\right)\sqrt{\frac{1}{2}-\frac{\sqrt{5}}{2}}}\left(\ln\left(\frac{\sqrt{2}x\sqrt{-\sqrt{5}-1}}{2}+\frac{\sqrt{2}\sqrt{-\sqrt{5}+1}}{2}\sqrt{x^2+1}\right)\right) \end{aligned}$$

2.5 $\int \frac{\cos^2(x)}{\sqrt{\cos^4(x)+\cos^2(x)+1}} dx$

2.5.1 Mathematica

```
ClearAll[x]
integrand = Cos[x]^2/Sqrt[Cos[x]^4 + Cos[x]^2 + 1];
res = Integrate[integrand, x];
TeXForm[res]
```

$$\frac{2i\cos^2(x)\sqrt{1-\frac{2i\tan^2(x)}{\sqrt{3}-3i}}\sqrt{1+\frac{2i\tan^2(x)}{\sqrt{3}+3i}}\text{EllipticPi}\left(\frac{3}{2}+\frac{i\sqrt{3}}{2},i\sinh^{-1}\left(\sqrt{-\frac{2i}{\sqrt{3}-3i}}\tan(x)\right),\frac{-\sqrt{3}+3i}{\sqrt{3}+3i}\right)}{\sqrt{-\frac{i}{\sqrt{3}-3i}}\sqrt{8\cos(2x)+\cos(4x)+15}}$$

2.5.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = Cos[x]^2/Sqrt[Cos[x]^4 + Cos[x]^2 + 1];
res = Int[integrand, x];
TeXForm[res]
```

$$\begin{aligned} & -\frac{(1+\sqrt{3})\cos^2(x)(\tan^2(x)+\sqrt{3})\sqrt{\frac{\tan^4(x)+3\tan^2(x)+3}{(\tan^2(x)+\sqrt{3})^2}}\operatorname{EllipticF}\left(2\tan^{-1}\left(\frac{\tan(x)}{\sqrt[4]{3}}\right),\frac{1}{4}(2-\sqrt{3})\right)}{4\sqrt[4]{3}\sqrt{\cos^4(x)(\tan^4(x)+3\tan^2(x)+3)}} \\ & +\frac{(2+\sqrt{3})\cos^2(x)(\tan^2(x)+\sqrt{3})\sqrt{\frac{\tan^4(x)+3\tan^2(x)+3}{(\tan^2(x)+\sqrt{3})^2}}\operatorname{EllipticPi}\left(\frac{1}{6}(3-2\sqrt{3}),2\tan^{-1}\left(\frac{\tan(x)}{\sqrt[4]{3}}\right),\frac{1}{4}(2-\sqrt{3})\right)}{4\sqrt[4]{3}\sqrt{\cos^4(x)(\tan^4(x)+3\tan^2(x)+3)}} \\ & +\frac{\cos^2(x)\tan^{-1}\left(\frac{\tan(x)}{\sqrt{\tan^4(x)+3\tan^2(x)+3}}\right)\sqrt{\tan^4(x)+3\tan^2(x)+3}}{2\sqrt{\cos^4(x)(\tan^4(x)+3\tan^2(x)+3)}} \end{aligned}$$

2.5.3 Maple

```
restart;
integrand:= cos(x)^2/sqrt(cos(x)^4 + cos(x)^2 + 1);
res:=int(integrand,x);
latex(res)
```

$$-2\frac{\sqrt{((\cos(2x))^2+4\cos(2x)+7)(\sin(2x))^2(-3+i\sqrt{3})(\cos(2x)+1)^2}}{(-1+i\sqrt{3})\sqrt{(\cos(2x)-1)(\cos(2x)+1)(\cos(2x)+2+i\sqrt{3})(i\sqrt{3}-\cos(2x)-2)\sin(2x)}\sqrt{(\cos(2x)+1)^2}}$$

2.5.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
integrand:= cos(x)^2/sqrt(cos(x)^4 + cos(x)^2 + 1);
res:=integrate(integrand,x);
latex(res)
```

$$\frac{\arctan\left(\frac{2\cos(x)^3\sin(x)\sqrt{\cos(x)^4+\cos(x)^2+1}}{2\cos(x)^6-1}\right)}{6}$$

2.5.5 Maxima

```
integrand : cos(x)^2/sqrt(cos(x)^4 + cos(x)^2 + 1);
res : integrate(integrand,x);
latex(res)
```

did not solve

2.5.6 XCAS

```
integrand := cos(x)^2/sqrt(cos(x)^4 + cos(x)^2 + 1);
res := integrate(integrand,x);
latex(res)
```

did not solve

2.5.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = integrand = cos(x)**2/sqrt(cos(x)**4 + cos(x)**2 + 1);
res = integrate(integrand,x);
latex(res)
```

did not solve

2.5.8 MuPad

```
evalin(symengine,'int(cos(x)^2/sqrt(cos(x)^4 + cos(x)^2 + 1),x)')
```

did not solve

2.6 $\int \tan(x)\sqrt{\tan^4(x)+1} \, dx$

2.6.1 Mathematica

```
ClearAll[x]
integrand = Tan[x] Sqrt[1 + Tan[x]^4];
res = Integrate[integrand, x];
TeXForm[res]
```

$$\frac{\sqrt{\tan^4(x)+1}\left(\sqrt{\cos(4x)+3}-2\sqrt{2}\cos^2(x)\sinh^{-1}(\cos(2x))-2\cos^2(x)\tanh^{-1}\left(\frac{2\sin^2(x)}{\sqrt{\cos(4x)+3}}\right)\right)}{2\sqrt{\cos(4x)+3}}$$

2.6.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = Tan[x] Sqrt[1 + Tan[x]^4];
res = Int[integrand, x];
TeXForm[res]
```

$$\frac{1}{2}\sqrt{\tan^4(x)+1}-\frac{\tanh^{-1}\left(\frac{1-\tan^2(x)}{\sqrt{2}\sqrt{\tan^4(x)+1}}\right)}{\sqrt{2}}-\frac{1}{2}\sinh^{-1}\left(\tan^2(x)\right)$$

2.6.3 Maple

```
restart;
integrand := tan(x)*sqrt(1 + tan(x)^4);
res:=int(integrand,x);
latex(res)
```

$$\frac{1}{2}\sqrt{(1+(\tan(x))^2)^2-2(\tan(x))^2}-\frac{\operatorname{arcsinh}((\tan(x))^2)}{2}-\frac{\sqrt{2}}{2}\operatorname{arctanh}\left(\frac{(-2(\tan(x))^2+2)\sqrt{2}}{4}\frac{1}{\sqrt{(1+(\tan(x))^2)^2-2(\tan(x))^2}}\right)$$

2.6.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
integrand := tan(x)*sqrt(1 + tan(x)^4);
res:=integrate(integrand,x);
latex(res)
```

$$\frac{2\log\left(\sqrt{\tan(x)^4+1}-\tan(x)^2\right)+\sqrt{2}\log\left(\frac{(2\sqrt{2}\tan(x)^2-2\sqrt{2})\sqrt{\tan(x)^4+1}+3\tan(x)^4-2\tan(x)^2+3}{\tan(x)^4+2\tan(x)^2+1}\right)+2\sqrt{\tan(x)^4+1}}{4}$$

2.6.5 Maxima

```
integrand : tan(x)*sqrt(1 + tan(x)^4);
res : integrate(integrand,x);
tex(res);
```

did not solve

2.6.6 XCAS

```
integrand := tan(x)*sqrt(1 + tan(x)^4);
res := integrate(integrand,x);
latex(res)
```

$$\frac{\sqrt{\tan^4 x + 1} + 2\left(\frac{\ln(\sqrt{\tan^4 x + 1} - \tan^2 x)}{2} + \frac{\ln\left(\frac{-2(\sqrt{\tan^4 x + 1} - \tan^2 x) + 2 + 2\sqrt{2}}{2(\sqrt{\tan^4 x + 1} - \tan^2 x) - 2 + 2\sqrt{2}}\right)}{\sqrt{2}}\right)}{2}$$

2.6.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = tan(x)*sqrt(1 + tan(x)**4);
res = integrate(integrand,x);
latex(res)
```

did not solve

2.6.8 MuPad

```
evalin(symengine,'int(tan(x)*sqrt(1 + tan(x)^4),x)')
```

did not solve

2.7 $\int \frac{\tan(x)}{\sqrt{\sec^3(x)+1}} \, dx$

2.7.1 Mathematica

```
ClearAll[x]
integrand = Tan[x]/Sqrt[Sec[x]^3 + 1];
res = Integrate[integrand, x]
TeXForm[res]
```

$$-\frac{2}{3} \tanh^{-1} \left(\sqrt{\sec^3(x) + 1} \right)$$

2.7.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = Tan[x]/Sqrt[Sec[x]^3 + 1];
res = Int[integrand, x]
TeXForm[res]
```

$$-\frac{2}{3} \tanh^{-1} \left(\sqrt{\sec^3(x) + 1} \right)$$

2.7.3 Maple

```
restart;
integrand := tan(x)/sqrt(sec(x)^3 + 1);
res:=int(integrand,x);
latex(res)
```

$$-\frac{2}{3}\operatorname{arctanh}\left(\sqrt{(\sec(x))^3+1}\right)$$

2.7.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
integrand := tan(x)/sqrt(sec(x)^3 + 1);
res:=integrate(integrand,x);
latex(res)
```

$$\frac{\log\left(2\cos(x)^3\sqrt{\frac{\cos(x)^3+1}{\cos(x)^3}}-2\cos(x)^3-1\right)}{3}$$

2.7.5 Maxima

```
integrand : tan(x)/sqrt(sec(x)^3 + 1);
res : integrate(integrand,x);
tex(res)
```

$$\frac{\log\left(\sqrt{\frac{1}{\cos^3 x}+1}-1\right)}{3}-\frac{\log\left(\sqrt{\frac{1}{\cos^3 x}+1}+1\right)}{3}$$

2.7.6 XCAS

```
integrand := tan(x)/sqrt(sec(x)^3 + 1);
res := integrate(integrand,x);
latex(res)
```

$$2\left(-\frac{\ln\left(\sqrt{\left(\frac{1}{\cos x}\right)^3+1}+1\right)}{6}+\frac{\ln\left|\sqrt{\left(\frac{1}{\cos x}\right)^3+1}-1\right|}{6}\right)$$

2.7.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = tan(x)/sqrt(sec(x)**3 + 1);
res = integrate(integrand,x);
latex(res)
```

did not solve

2.7.8 MuPad

```
evalin(symengine,'int(tan(x)/sqrt(sec(x)^3 + 1),x)')
```

did not solve

2.8 $\int \sqrt{\tan^2(x) + 2 \tan(x) + 2} \, dx$

2.8.1 Mathematica

```
ClearAll[x];
integrand = Sqrt[Tan[x]^2 + 2 Tan[x] + 2];
res = Integrate[integrand, x];
TeXForm[res]
```

$$\sinh^{-1}(\tan(x) + 1) + \frac{1}{2}i \left(\sqrt{1 + 2i} \tanh^{-1} \left(\frac{(1 + i) \tan(x) + (2 + i)}{\sqrt{1 + 2i} \sqrt{\tan^2(x) + 2 \tan(x) + 2}} \right) - \sqrt{1 - 2i} \tanh^{-1} \left(\frac{(2 - 2i) \tan(x) + (4 - 2i)}{2\sqrt{1 - 2i} \sqrt{\tan^2(x) + 2 \tan(x) + 2}} \right) \right)$$

2.8.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = Sqrt[Tan[x]^2 + 2 Tan[x] + 2];
res = Int[integrand, x];
TeXForm[res]
```

$$-\sqrt{\frac{1}{2} (1 + \sqrt{5})} \tan^{-1} \left(\frac{2\sqrt{5} - (5 + \sqrt{5}) \tan(x)}{\sqrt{10 (1 + \sqrt{5})} \sqrt{\tan^2(x) + 2 \tan(x) + 2}} \right) - \sqrt{\frac{1}{2} (\sqrt{5} - 1)} \tanh^{-1} \left(\frac{(5 - \sqrt{5}) \tan(x) + 2\sqrt{5}}{\sqrt{10 (\sqrt{5} - 1)} \sqrt{\tan^2(x) + 2 \tan(x) + 2}} \right) + \sinh^{-1}(\tan(x) + 1)$$

2.8.3 Maple

```
restart;
integrand := sqrt(tan(x)^2 + 2*tan(x) + 2);
res:=simplify(int(integrand,x));
latex(res)
```

$$-10 \frac{1}{\sqrt{-10 + 10 \sqrt{5} \cos(x) (\sqrt{5} - 5)}} \left(-\sqrt{2} \sqrt{\frac{2 \sin(x) \cos(x) + (\cos(x))^2 + 1}{\cos(x) (2 \sin(x) + \cos(x)) \sqrt{5} + (\cos(x))^2 + 2 \sin(x) \cos(x)}} \right)$$

2.8.4 Fricas

```
integrand := sqrt(tan(x)^2 + 2*tan(x) + 2);
res:=integrate(integrand,x);
latex(res)
```

$$8 \sqrt[4]{5} \arctan \left(\frac{\left((-375 \sqrt{5} + 625) \sqrt[4]{5} \cos(x) \sin(x) + (125 \sqrt{5} - 625) \sqrt[4]{5} \cos(x)^2 \right) \sqrt{\frac{\sqrt{5}-5}{\sqrt{5}-3}} \sqrt{\frac{2 \cos(x) \sin(x) + \cos(x)^2 + 1}{\cos(x)^2}} + \left((\sqrt{5}-1) \sqrt{\frac{\sqrt{5}-5}{\sqrt{5}-3}} \right)}{\right)}$$

2.8.5 Maxima

```
integrand : sqrt(tan(x)^2 + 2*tan(x) + 2);
res : integrate(integrand,x);
```

did not solve

2.8.6 XCAS

```
integrand := sqrt(tan(x)^2 + 2*tan(x) + 2);
res := integrate(integrand,x);
latex(res)
```

$$\begin{aligned} & 2 \left(-\frac{\ln \left(\sqrt{\tan^2 x + 2 \tan x + 2} - \tan x - 1 \right)}{2} \right. \\ & + \frac{1}{8} \sqrt{2 \left(\sqrt{5} - 1 \right)} \left(1 - \frac{32i}{16\sqrt{5} - 16} \right) \ln \left(-16 \left(1 + \frac{512i}{512\sqrt{5} - 1024} \right) \sqrt{\sqrt{5} - 2} \right. \\ & + (-16 + 16i) + (16 + 16i) \left(\sqrt{\tan^2 x + 2 \tan x + 2} - \tan x \right) \Big) \\ & - \frac{1}{8} \sqrt{2 \left(\sqrt{5} - 1 \right)} \left(1 - \frac{32i}{16\sqrt{5} - 16} \right) \ln \left(16 \left(1 + \frac{512i}{512\sqrt{5} - 1024} \right) \sqrt{\sqrt{5} - 2} \right. \\ & + (-16 + 16i) + (16 + 16i) \left(\sqrt{\tan^2 x + 2 \tan x + 2} - \tan x \right) \Big) \\ & + \frac{1}{8} \sqrt{2 \left(\sqrt{5} - 1 \right)} \left(1 + \frac{32i}{16\sqrt{5} - 16} \right) \ln \left(-16 \left(1 + \frac{512i}{512\sqrt{5} + 1024} \right) \sqrt{\sqrt{5} + 2} \right. \\ & + (16 - 16i) + (16 + 16i) \left(\sqrt{\tan^2 x + 2 \tan x + 2} - \tan x \right) \Big) \\ & - \frac{1}{8} \sqrt{2 \left(\sqrt{5} - 1 \right)} \left(1 + \frac{32i}{16\sqrt{5} - 16} \right) \ln \left(16 \left(1 + \frac{512i}{512\sqrt{5} + 1024} \right) \sqrt{\sqrt{5} + 2} \right. \\ & + (16 - 16i) + (16 + 16i) \left(\sqrt{\tan^2 x + 2 \tan x + 2} - \tan x \right) \Big) \Big) \end{aligned}$$

2.8.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = sqrt(tan(x)**2 + 2*tan(x) + 2);
res = integrate(integrand,x);
latex(res)
```

did not solve

2.8.8 MuPad

```
evalin(symengine,'int(sqrt(tan(x)^2 + 2*tan(x) + 2),x)')
```

did not solve

2.9 $\int \sin(x) \tan^{-1} \left(\sqrt{\sec(x) - 1} \right) dx$

2.9.1 Mathematica

```
ClearAll[x];
integrand = Sin[x] ArcTan[Sqrt[Sec[x] - 1]];
res = Integrate[integrand, x]
TeXForm[res]
```

$$\begin{aligned} & -\frac{1}{2}(-3-2\sqrt{2})\left(\left(\sqrt{2}-2\right)\cos\left(\frac{x}{2}\right)-\sqrt{2}\right. \\ & \left.+1\right)\cos^2\left(\frac{x}{4}\right)\sqrt{-\tan^2\left(\frac{x}{4}\right)-2\sqrt{2}+3}\sqrt{\left(2\sqrt{2}-3\right)\tan^2\left(\frac{x}{4}\right)+1}\cot\left(\frac{x}{4}\right)\sqrt{\sec(x)-1}\sec(x)\sqrt{\left(\left(10-7\sqrt{2}\right)\right.} \\ & \left.-12\sqrt{2}\right)+2\text{EllipticPi}\left(2\sqrt{2}-3,-\sin^{-1}\left(\frac{\tan\left(\frac{x}{4}\right)}{\sqrt{3-2\sqrt{2}}}\right),17-12\sqrt{2}\right)\Bigg) \\ & +\frac{1}{2}\cos(x)\sqrt{\sec(x)-1}-\cos(x)\tan^{-1}\left(\sqrt{\sec(x)-1}\right) \end{aligned}$$

2.9.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = Sin[x] ArcTan[Sqrt[Sec[x] - 1]];
res = Int[integrand, x];
TeXForm[res]
```

$$\frac{1}{2}\cos(x)\sqrt{\sec(x)-1}+\frac{1}{2}\tan^{-1}\left(\sqrt{\sec(x)-1}\right)-\cos(x)\tan^{-1}\left(\sqrt{\sec(x)-1}\right)$$

2.9.3 Maple

```
restart;
integrand := sin(x)*arctan(sqrt(sec(x) - 1));
res:=int(integrand,x);
latex(res)
```

$$-\frac{1}{\sec(x)} \arctan\left(\sqrt{-(-1 + (\sec(x))^{-1}) \sec(x)}\right) + \frac{1}{2 \sec(x)} \sqrt{\sec(x) - 1} + \frac{1}{2} \arctan\left(\sqrt{\sec(x) - 1}\right)$$

2.9.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
integrand := sin(x)*atan(sqrt(sec(x) - 1));
res:=integrate(integrand,x);
latex(res)
```

$$\frac{(-2 \cos(x) + 1) \arctan\left(\sqrt{\sec(x) - 1}\right) + \cos(x) \sqrt{\frac{-\cos(x)+1}{\cos(x)}}}{2}$$

2.9.5 Maxima

```
integrand : sin(x)*atan(sqrt(sec(x) - 1));
res : integrate(integrand,x);
tex(res);
```

$$-\cos x \arctan\left(\frac{\sqrt{1 - \cos x}}{\sqrt{\cos x}}\right) + \frac{\arctan\left(\frac{\sqrt{1 - \cos x}}{\sqrt{\cos x}}\right)}{2} + \frac{\sqrt{1 - \cos x}}{\left(2 - \frac{2(\cos x - 1)}{\cos x}\right) \sqrt{\cos x}}$$

2.9.6 XCAS

```
integrand := sin(x)*atan(sqrt(sec(x) - 1));
res := integrate(integrand,x);
```

Warning, integration of abs or sign assumes constant sign by intervals (correct if the argument is real):

Check [abs(cos(x))]

Discontinuities at zeroes of cos(x) were not checked

```
latex(res)
```

Unable to conver to latex. Here is the raw output

```
expr:=(1/2*asin(2*cos(x)-1)/(sign(cos(x))^2-1)+sign(cos(x))^2*
atan(1/2*(sign(cos(x))^2+(-2*sqrt(-cos(x)^2+cos(x))+1)/(-2*cos(x)+1)
+(-2*sqrt(-cos(x)^2+cos(x))+1)*sign(cos(x))^2/(-2*cos(x)+1)-1)/sign(cos(x)))/
((sign(cos(x))^2-1)*sign(cos(x))))*sign(cos(x))
-cos(x)*atan(sqrt(-cos(x)^2+cos(x))*sign(cos(x))/cos(x));
```

2.9.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = sin(x)*atan(sqrt(sec(x) - 1));
res = integrate(integrand,x);
latex(res)
```

did not solve

2.9.8 MuPad

```
evalin(symengine,'int(sin(x)*arctan(sqrt(sec(x) - 1)),x)')
```

$$-\arctan\left(\sqrt{(\cos(x))^{-1}-1}\right)\cos(x) - \frac{\cos(x)}{3}\left(\frac{3}{2}\arcsin\left(\sqrt{\cos(x)}\right)(\cos(x))^{-\frac{3}{2}} - \frac{3}{2\cos(x)}\sqrt{1-\cos(x)}\right)\sqrt{1-\cos(x)}\frac{1}{\sqrt{(\cos(x))^{-1}-1}}$$

2.10 $\int \frac{x^3 e^{\sin^{-1}(x)}}{\sqrt{1-x^2}} dx$

2.10.1 Mathematica

```
ClearAll[x];
integrand = (x^3 Exp[ArcSin[x]])/Sqrt[1 - x^2];
res = Integrate[integrand, x]
TeXForm[res]
```

$$-\frac{1}{40}e^{\sin^{-1}(x)}\left(15\left(\sqrt{1-x^2}-x\right)+\sin\left(3\sin^{-1}(x)\right)-3\cos\left(3\sin^{-1}(x)\right)\right)$$

2.10.2 Rubi

```
<< Rubi`
ClearAll[x]
integrand = (x^3 Exp[ArcSin[x]])/Sqrt[1 - x^2];
res = Int[integrand, x];
TeXForm[res]
```

$$\frac{1}{10}x^3e^{\sin^{-1}(x)}-\frac{3}{10}\sqrt{1-x^2}x^2e^{\sin^{-1}(x)}-\frac{3}{10}\sqrt{1-x^2}e^{\sin^{-1}(x)}+\frac{3}{10}xe^{\sin^{-1}(x)}$$

2.10.3 Maple

```
restart;
integrand := (x^3*exp(1)^arcsin(x))/sqrt(1 - x^2);
res:=int(integrand,x);
latex(res)
```

$$\frac{e^{\arcsin(x)}x^2}{10}\left(x-3\sqrt{-x^2+1}\right)+\frac{3e^{\arcsin(x)}}{10}\left(x-\sqrt{-x^2+1}\right)$$

2.10.4 Fricas

```
set output tex off
setSimplifyDenomsFlag(true)
integrand := (x^3*exp(asin(x)))/sqrt(1 - x^2);
res:=integrate(integrand,x);
latex(res)
```

$$\frac{\left((-3\,x^2-3)\sqrt{-x^2+1}+x^3+3\,x\right)e^{\arcsin(x)}}{10}$$

2.10.5 Maxima

```
integrand : (x^3*exp(asin(x)))/sqrt(1 - x^2);
res : integrate(integrand,x);
tex(res);
```

did not solve

2.10.6 XCAS

```
integrand := (x^3*exp(asin(x)))/sqrt(1 - x^2);
res := integrate(integrand,x);
latex(res)
```

$$\frac{2}{5}xe^{\arcsin x}-\frac{3}{5}\sqrt{-x^2+1}e^{\arcsin x}+\frac{3}{10}\sqrt{-x^2+1}(-x^2+1)e^{\arcsin x}-\frac{1}{10}x(-x^2+1)e^{\arcsin x}$$

2.10.7 Sympy

```
>python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux

from sympy import *
x = symbols('x')
integrand = (x**3*exp(asin(x)))/sqrt(1 - x**2);
res = integrate(integrand,x);
latex(res)
```

$$\frac{x^3e^{\operatorname{asin}(x)}}{10}-\frac{3x^2\sqrt{1-x^2}e^{\operatorname{asin}(x)}}{10}+\frac{3xe^{\operatorname{asin}(x)}}{10}-\frac{3\sqrt{1-x^2}e^{\operatorname{asin}(x)}}{10}$$

2.10.8 MuPad

```
evalin(symengine,'int( (x^3*exp(arcsin(x)))/sqrt(1 - x^2),x)')
```

did not solve