

Ten Hard Integrals

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April 24, 2020

Compiled on September 11, 2023 at 5:25pm

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CHAPTER 1

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 or 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.

CHAPTER 2

INTEGRALS

2.1	$\int \arcsin(x) \ln(x) dx$	5
2.2	$\int \frac{x \arcsin(x)}{\sqrt{1-x^2}} dx$	8
2.3	$\int -\sin^{-1}(\sqrt{x} - \sqrt{x+1}) dx$	10
2.4	$\int \log(\sqrt{x^2+1}x+1) dx$	12
2.5	$\int \frac{\cos^2(x)}{\sqrt{\cos^4(x)+\cos^2(x)+1}} dx$	17
2.6	$\int \tan(x) \sqrt{\tan^4(x)+1} dx$	20
2.7	$\int \frac{\tan(x)}{\sqrt{\sec^3(x)+1}} dx$	22
2.8	$\int \sqrt{\tan^2(x)+2\tan(x)+2} dx$	24
2.9	$\int \sin(x) \tan^{-1}(\sqrt{\sec(x)-1}) dx$	27
2.10	$\int \frac{x^3 e^{\sin^{-1}(x)}}{\sqrt{1-x^2}} dx$	30

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

2.1.1 Mathematica

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

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

2.1.2 Rubi

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

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

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)
```

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

2.1.8 MuPad

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

did not solve

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

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]
```

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

2.3.2 Rubi

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

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

2.3.3 Maple

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

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

2.3.4 Fricas

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

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

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 [92.10
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters values [53.12
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters values [5.383
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters values [6.793
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters values [84.35
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters values [77.64
Warning, choosing root of [1,0,%%{-4,[1]%%}+%%{-2,[0]%%},0,1] at parameters values [72.51
```

```
Warning, need to choose a branch for the root of a polynomial with parameters. This might be w
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 w
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 [69.923
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

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

2.4.1 Mathematica

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

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

2.4.2 Rubi

```

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

```

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

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)
```

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

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)
```

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

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

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

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]
```

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

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 = 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]
```

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

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]
```

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

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)
```

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

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)
```

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

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]
```

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

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 constant)
 Check [abs(cos(x))]
 Discontinuities at zeroes of cos(x) were not checked

```
latex(res)
```

Unable to convert 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]
```

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

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)
```

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

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)
```

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

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)
```

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

2.10.8 MuPad

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

did not solve