

# A table of derivatives and anti-derivatives

This example is based upon a nice example in the Pythontex gallery, see <https://github.com/gpoore/pythontex/>. It uses a tagged block to capture the Sympy output for later use in the body of the LaTeX table.

```
1  from sympy import *
2
3  var('x')
4
5  # Create a list of functions to include in the table
6  funcs = [['sin(x)',r'\'],      ['cos(x)',r'\'],      ['tan(x)',r'\'],
7           ['asin(x)',r'\[5pt]'], ['acos(x)',r'\[5pt]'], ['atan(x)',r'\[5pt]'],
8           ['sinh(x)',r'\'],      ['cosh(x)',r'\'],      ['tanh(x)',r' ']]
9
10 # pyBeg (CalculusTable)
11 for func, eol in funcs:
12     myddx = 'Derivative(' + func + ', x)'
13     myint = 'Integral(' + func + ', x)'
14     print(latex(eval(myddx)) + '&=' + latex(eval(myddx + '.doit()'))) + r'\quad & \quad')
15     print(latex(eval(myint)) + '&=' + latex(eval(myint + '.doit()'))) + eol)
16 # pyEnd (CalculusTable)
```

```
\begin{align*}
\py {CalculusTable}
\end{align*}
```

$$\begin{aligned}\frac{d}{dx} \sin (x) &= \cos (x) \\ \frac{d}{dx} \cos (x) &= -\sin (x) \\ \frac{d}{dx} \tan (x) &= \tan ^2(x)+1 \\ \frac{d}{dx} \operatorname{asin}(x) &= \frac{1}{\sqrt{1-x^2}} \\ \frac{d}{dx} \operatorname{acos}(x) &= -\frac{1}{\sqrt{1-x^2}} \\ \frac{d}{dx} \operatorname{atan}(x) &= \frac{1}{x^2+1} \\ \frac{d}{dx} \sinh (x) &= \cosh (x) \\ \frac{d}{dx} \cosh (x) &= \sinh (x) \\ \frac{d}{dx} \tanh (x) &= 1-\tanh ^2(x)\end{aligned}$$

$$\begin{aligned}\int \sin (x) d x &= -\cos (x) \\ \int \cos (x) d x &= \sin (x) \\ \int \tan (x) d x &= -\log (\cos (x)) \\ \int \operatorname{asin}(x) d x &= x \operatorname{asin}(x)+\sqrt{1-x^2} \\ \int \operatorname{acos}(x) d x &= x \operatorname{acos}(x)-\sqrt{1-x^2} \\ \int \operatorname{atan}(x) d x &= x \operatorname{atan}(x)-\frac{\log \left(x^2+1\right)}{2} \\ \int \sinh (x) d x &= \cosh (x) \\ \int \cosh (x) d x &= \sinh (x) \\ \int \tanh (x) d x &= x-\log (\tanh (x)+1)\end{aligned}$$