

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 Mathematica output for later use in the body of the LaTeX table.

```
1  (* Create a list of functions to include in the table *)
2  fun = {Sin[x],      Cos[x],      Tan[x],
3         ArcSin[x],   ArcCos[x],   ArcTan[x],
4         Sinh[x],     Cosh[x],     Tanh[x]};
5
6  eol = {"\\\\" ,      "\\\" ,      "\\\" ,
7         "\\\"[5pt]", "\\\"[5pt]", "\\\"[5pt]",
8         "\\\" ,      "\\\" ,      " "};
9
10 ddxfun = D[#, x] & /@ fun;
11 intfun = Integrate[#, x] & /@ fun;
12
13 ddxfunHold = HoldForm[D[#, x]] & /@ fun;
14 intfunHold = HoldForm[Integrate[#, x]] & /@ fun;
15
16 (* mmaBeg (CalculusTable) *)
17 Do[Print[OutputForm[
18     ToString[TeXForm[ddxfunHold[[i]]]] <> "&=" <>
19     ToString[TeXForm[ddxfun[[i]]]]      <> "\\quad & \\quad"
20     ToString[TeXForm[intfunHold[[i]]]] <> "&=" <>
21     ToString[TeXForm[intfun[[i]]]]      <>
22     eol[[i]]
23     ]], {i,1,9}]
24 (* mmaEnd (CalculusTable) *)
```

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

$$\begin{aligned}\frac{\partial \sin(x)}{\partial x} &= \cos(x) \\ \frac{\partial \cos(x)}{\partial x} &= -\sin(x) \\ \frac{\partial \tan(x)}{\partial x} &= \sec^2(x) \\ \frac{\partial \sin^{-1}(x)}{\partial x} &= \frac{1}{\sqrt{1-x^2}} \\ \frac{\partial \cos^{-1}(x)}{\partial x} &= -\frac{1}{\sqrt{1-x^2}} \\ \frac{\partial \tan^{-1}(x)}{\partial x} &= \frac{1}{x^2+1} \\ \frac{\partial \sinh(x)}{\partial x} &= \cosh(x) \\ \frac{\partial \cosh(x)}{\partial x} &= \sinh(x) \\ \frac{\partial \tanh(x)}{\partial x} &= \operatorname{sech}^2(x)\end{aligned}$$

$$\begin{aligned}\int \sin(x) \, dx &= -\cos(x) \\ \int \cos(x) \, dx &= \sin(x) \\ \int \tan(x) \, dx &= -\log(\cos(x)) \\ \int \sin^{-1}(x) \, dx &= \sqrt{1-x^2} + x \sin^{-1}(x) \\ \int \cos^{-1}(x) \, dx &= x \cos^{-1}(x) - \sqrt{1-x^2} \\ \int \tan^{-1}(x) \, dx &= x \tan^{-1}(x) - \frac{1}{2} \log(x^2+1) \\ \int \sinh(x) \, dx &= \cosh(x) \\ \int \cosh(x) \, dx &= \sinh(x) \\ \int \tanh(x) \, dx &= \log(\cosh(x))\end{aligned}$$