

## Basic Differentiation Rules

1.  $(cf)' = cf'$
2.  $(f \pm g)' = f' \pm g'$
3.  $(fg)' = f'g + fg'$
4.  $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$
5.  $(f(g(x)))' = f'(g(x))g'(x)$
6.  $(x^\alpha)' = \alpha x^{\alpha-1}$
7.  $(e^x)' = e^x$
8.  $(a^x)' = a^x \ln a, \quad a > 0$
9.  $(\ln x)' = \frac{1}{x}$
10.  $(\log_a x)' = \frac{1}{x \ln a}, \quad a > 0$
11.  $(\sin x)' = \cos x$
12.  $(\cos x)' = -\sin x$
13.  $(\tan x)' = \sec^2 x$
14.  $(\cot x)' = -\csc^2 x$
15.  $(\sec x)' = \tan x \sec x$
16.  $(\csc x)' = -\cot x \csc x$
17.  $(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}$
18.  $(\arccos x)' = -\frac{1}{\sqrt{1-x^2}}$
19.  $(\arctan x)' = \frac{1}{1+x^2}$
20.  $(f(x)^{g(x)})' = \mathbf{EXTRA CREDIT ; -}$