

# List of Derivative Rules

Below is a list of all the derivative rules we went over in class.

- **Constant Rule:**  $f(x) = c$  then  $f'(x) = 0$
  
- **Constant Multiple Rule:**  $g(x) = c \cdot f(x)$  then  $g'(x) = c \cdot f'(x)$
  
- **Power Rule:**  $f(x) = x^n$  then  $f'(x) = nx^{n-1}$
  
- **Sum and Difference Rule:**  $h(x) = f(x) \pm g(x)$  then  $h'(x) = f'(x) \pm g'(x)$
  
- **Product Rule:**  $h(x) = f(x)g(x)$  then  $h'(x) = f'(x)g(x) + f(x)g'(x)$
  
- **Quotient Rule:**  $h(x) = \frac{f(x)}{g(x)}$  then  $h'(x) = \frac{f'(x)g(x) - f(x)g'(x)}{g(x)^2}$
  
- **Chain Rule:**  $h(x) = f(g(x))$  then  $h'(x) = f'(g(x))g'(x)$
  
- **Trig Derivatives:**
  - $f(x) = \sin(x)$  then  $f'(x) = \cos(x)$
  - $f(x) = \cos(x)$  then  $f'(x) = -\sin(x)$
  - $f(x) = \tan(x)$  then  $f'(x) = \sec^2(x)$
  - $f(x) = \sec(x)$  then  $f'(x) = \sec(x)\tan(x)$
  - $f(x) = \cot(x)$  then  $f'(x) = -\csc^2(x)$
  - $f(x) = \csc(x)$  then  $f'(x) = -\csc(x)\cot(x)$
  
- **Exponential Derivatives**
  - $f(x) = a^x$  then  $f'(x) = \ln(a)a^x$
  - $f(x) = e^x$  then  $f'(x) = e^x$
  - $f(x) = a^{g(x)}$  then  $f'(x) = \ln(a)a^{g(x)}g'(x)$
  - $f(x) = e^{g(x)}$  then  $f'(x) = e^{g(x)}g'(x)$
  
- **Logarithm Derivatives**
  - $f(x) = \log_a(x)$  then  $f'(x) = \frac{1}{\ln(a)x}$
  - $f(x) = \ln(x)$  then  $f'(x) = \frac{1}{x}$
  - $f(x) = \log_a(g(x))$  then  $f'(x) = \frac{g'(x)}{\ln(a)g(x)}$
  - $f(x) = \ln(g(x))$  then  $f'(x) = \frac{g'(x)}{g(x)}$