Derivative Rules:

$\frac{d}{dx}(c)=0$	$\frac{d}{dx}(x^n)=nx^{n-1}$	
$\frac{d}{dx}(\sin x)=\cos x$ $\frac{d}{dx}(\sec x)=\sec x\tan x$ $\frac{d}{dx}(\tan x)=\sec^2 x$	$\frac{d}{dx}(\cos x)=-\sin x$ $\frac{d}{dx}(\csc x)=-\csc x\cot x$ $\frac{d}{dx}(\cot x)=-\csc^2 x$	$\frac{d}{dx}(a^x)=a^x\ln a$ $\frac{d}{dx}(e^x)=e^x$
$\frac{d}{dx}(cf(x))=c\frac{d}{dx}(f(x))$	$\frac{d}{dx}(f(x)\pm g(x))=\frac{d}{dx}(f(x))\pm\frac{d}{dx}(g(x))$	
$(f\cdot g)'=f'\cdot g+f\cdot g'$	$\left(\frac{f}{g}\right)'=\frac{f'g-fg'}{g^2}$	$\frac{d}{dx}(f(g(x)))=f'(g(x))g'(x)$

Derivatives	
Definition of a Derivative of a Function Slope Function	$f'(x) = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(c) = \lim_{x\to c}\frac{f(x)-f(c)}{x-c}$
Notation for Derivatives	$f'(x),\ f^{(n)}(x), \frac{dy}{dx}, y', \frac{d}{dx}[f(x)],\ D_x[y]$
0. The Chain Rule	$\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$ $\frac{dy}{dx} = \frac{dy}{dt}\cdot\frac{dt}{dx}$
1. The Constant Multiple Rule	$\frac{d}{dx}[cf(x)] = cf'(x)$
2. The Sum and Difference Rule	$\frac{d}{dx}[f(x)\pm g(x)] = f'(x)\pm g'(x)$
3. The Product Rule	$\frac{d}{dx}[fg] = fg' + g\,f'$
4. The Quotient Rule	$\frac{d}{dx}\left[\frac{f}{g}\right] = \frac{gf'-fg'}{g^2}$
5. The Constant Rule	$\frac{d}{dx}[c] = 0$
6a. The Power Rule	$\frac{d}{dx}[x^n] = nx^{n-1}$
6b. The General Power Rule	$\frac{d}{dx}[u^n] = nu^{n-1}\,u'$ where $u = u(x)$
7. The Power Rule for x	$\frac{d}{dx}[x] = 1$ (think $x = x^1$ and $x^0 = 1$)

Derivatives

$$\frac{d}{dx} x^n = nx^{n-1}$$

$$\frac{d}{dx} \ln x = \frac{1}{x}$$

$$\frac{d}{dx} \log_b x = \frac{1}{x \ln b}$$

$$\frac{d}{dx} e^x = e^x$$

$$\frac{d}{dx} b^x = b^x \cdot \ln b$$

$$\frac{d}{dx} \sin x = \cos x$$

$$\frac{d}{dx} \cos x = -\sin x$$

$$\frac{d}{dx} \tan x = \sec^2 x$$

$$\frac{d}{dx} \sec x = \sec x \cdot \tan x$$

$$\frac{d}{dx} \arcsin x = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \arccos x = -\frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \arctan x = \frac{1}{1+x^2}$$

Differentiation Formulas

1. $\frac{d}{dx}(x^n) = nx^{n-1}$
2. $\frac{d}{dx}(fg) = fg' + gf'$
3. $\frac{d}{dx}(\frac{f}{g}) = \frac{gf' - fg'}{g^2}$
4. $\frac{d}{dx} f(g(x)) = f'(g(x))g'(x)$
5. $\frac{d}{dx}(\sin x) = \cos x$
6. $\frac{d}{dx}(\cos x) = -\sin x$
7. $\frac{d}{dx}(\tan x) = \sec^2 x$
8. $\frac{d}{dx}(\cot x) = -\csc^2 x$
9. $\frac{d}{dx}(\sec x) = \sec x \tan x$
10. $\frac{d}{dx}(\csc x) = -\csc x \cot x$
11. $\frac{d}{dx}(e^x) = e^x$
12. $\frac{d}{dx}(a^x) = a^x \ln a$
13. $\frac{d}{dx}(\ln x) = \frac{1}{x}$
14. $\frac{d}{dx}(Arc\sin x) = \frac{1}{\sqrt{1-x^2}}$
15. $\frac{d}{dx}(Arc\tan x) = \frac{1}{1+x^2}$
16. $\frac{d}{dx}(Arc\sec x) = \frac{1}{|x|\sqrt{x^2-1}}$
17. $\frac{dy}{dx} = \frac{dy}{dx} \times \frac{du}{dx}$ *Chain Rule*

Differentiation Formulas

1. $\frac{d}{dx}(x^n) = nx^{n-1}$
2. $\frac{d}{dx}(fg) = fg' + gf'$ *Product rule*
3. $\frac{d}{dx}(\frac{f}{g}) = \frac{gf' - fg'}{g^2}$ *Quotient rule*
4. $\frac{d}{dx} f(g(x)) = f'(g(x))g'(x)$ *Chain rule*
5. $\frac{d}{dx}(\sin x) = \cos x$
6. $\frac{d}{dx}(\cos x) = -\sin x$
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16. $\frac{d}{dx}(Arc\sec x) = \frac{1}{|x|\sqrt{x^2-1}}$
17. $\frac{d}{dx}[c] = 0$
18. $\frac{d}{dx}[cf(x)] = cf'(x)$

Differentiation Rules

Prod.

$$\frac{d}{dx}\left(f \cdot g\right) = f'g + fg'$$

Quot.

$$\frac{d}{dx}\left(\frac{f}{g}\right) = \frac{f'g - fg'}{g^2}$$

Chain

$$\frac{d}{dx} f\left(g(x)\right) = f'\left(g(x)\right) \cdot g'(x)$$