The rules of derivative:

i. $\frac{d}{dx}\big(f(x)+g(x)\big)=f'(x)+g'(x)$. **(sum rule)**

ii. $\frac{d}{dx}\big(f(x)-g(x)\big)=f'(x)-g'(x)$. **(difference rule)**

iii. $\frac{d}{dx}\big(f(x)\cdot g(x)\big)=f'(x)\cdot g(x)+f(x)\cdot g'(x)$. **(product rule)**

iv. $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right)=\frac{f'(x)\cdot g(x)-f(x)\cdot g'(x)}{[g(x)]^2}$. **(quotient rule)**

v. $\frac{d}{dx}\big(cf(x)\big)=c\frac{d}{dx}(f(x))=cf'(x)$. **(constant multiple rule)**

vi. $\frac{d}{dx}(c)=0$. **(Constant function).**

vii. $\frac{d}{dx}(x)=1$.

viii. $\frac{d}{dx}(x^n)=nx^{n-1}$, $where\ n\in\mathbb{R}$.

Derivatives of Trigonometric Functions:

$f(x)$	$\sin(x)$	$\cos(x)$	$\tan(x)$	$\cot(x)$	$\sec(x)$	$\csc(x)$
$f'(x)$	$\cos(x)$	$-\sin(x)$	$sec^2(x)$	$-csc^2(x)$	$\sec(x)\cdot\tan(x)$	$-\csc(x)\cdot\cot(x)$

Derivatives of Inverse Trigonometric Functions:

i. $\frac{d}{dx}(sin^{-1}(x))=\frac{1}{\sqrt{1-x^2}}$.

ii. $\frac{d}{dx}(cos^{-1}(x))=\frac{-1}{\sqrt{1-x^2}}$.

iii. $\frac{d}{dx}(tan^{-1}(x))=\frac{1}{1+x^2}$.

iv. $\frac{d}{dx}\big(cot^{-1}(x)\big)=\frac{-1}{1+x^2}$.

v. $\frac{d}{dx}(sec^{-1}(x))=\frac{1}{x\sqrt{x^2-1}}$.

vi. $\frac{d}{dx}(csc^{-1}(x))=\frac{-1}{x\sqrt{x^2-1}}$.

Derivatives of exponential Functions:

i. $\frac{d}{dx}(e^x)=e^x$.

ii. $\frac{d}{dx}(a^x)=a^x\cdot lna$.

Derivatives of logarithmic Functions:

i. $\frac{d}{dx}(\ln(x)) = \frac{1}{x}$.

ii. $\frac{d}{dx}(log_a x) = \frac{1}{x \cdot ln a}$.

The Chain Rule:

If $F(x) = (f \circ g)(x) = f(g(x))$ then $\frac{dF}{dx} = f'(g(x)) \cdot g'(x)$

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