Basic Derivative Rules:

If $y = cf(x)$, then $\frac{dy}{dx} = cf'(x)$, where c is a constant

If $y = f(x) \pm g(x)$, then $\frac{dy}{dx} = f'(x) \pm g'(x)$

If $y = f(x) \cdot g(x)$, then $\frac{dy}{dx} = g(x) \cdot f'(x) + f(x) \cdot g'(x)$ product rule

If $y = \frac{f(x)}{g(x)}$, then $\frac{dy}{dx} = \frac{g(x) \cdot f'(x) - f(x)g'(x)}{(g(x))^2}$ quotient rule

If $y = f(g(x))$, then $\frac{dy}{dx} = f'(g(x)) \cdot g'(x)$ chain rule

If $y = c$, (constant), then $\frac{dy}{dx} = 0$

If $y = x^n$, then $\frac{dy}{dx} = nx^{n-1}$

If $y = \sin x$, then $\frac{dy}{dx} = \cos x$

If $y = \cos x$, then $\frac{dy}{dx} = -\sin x$

If $y = \tan x$, then $\frac{dy}{dx} = \sec^2 x$

If $y = \cot x$, then $\frac{dy}{dx} = -\csc^2 x$

If $y = \sec x$, then $\frac{dy}{dx} = \sec x \tan x$

If $y = \csc x$,then $\frac{dy}{dx} = -\csc x \cot x$

If $y = \ln x$, then $\frac{dy}{dx} = \frac{1}{x}$

If $y = e^x$, then $\frac{dy}{dx} = e^x$

Basic Integration Formulae

$$\int [f(x) \pm g(x)]dx = \int f(x)dx \pm \int g(x)dx$$

$$\int 1dx = \int dx = x + C$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C, \quad n \neq -1$$

$$\int \frac{dx}{x} = \int \frac{1}{x}dx = \int x^{-1}dx = \ln|x| + c$$

$$\int e^x dx = e^x + C$$

$$\int \sin x dx = -\cos x + C$$

$$\int \cos x dx = \sin x + C$$

$$\int \sec^2 x dx = \tan x + C$$

$$\int \sec x \tan x dx = \sec x + C$$

$$\int \csc^2 x dx = -\cot x + C$$

$$\int \csc x \cot x dx = -\csc x + C$$

$$\int \frac{dx}{\sqrt{1-x^2}} = \int \frac{1}{\sqrt{1-x^2}}dx = \sin^{-1} x + C = \arcsin x + C$$

$$\int \frac{dx}{1+x^2} = \int \frac{1}{1+x^2}dx = \tan^{-1} x + C = \arctan x + C$$

$$\int \frac{dx}{x\sqrt{x^2-1}} = \int \frac{1}{x\sqrt{x^2-1}}dx = \sec^{-1} x + C = arc\sec x + C$$