Calculus Formulas

Trigonometry

$\sec x = \frac{1}{\cos x}$ $\csc x = \frac{1}{\sin x}$ $\tan x = \frac{\sin x}{\cos x}$ $\cot x = \frac{\cos x}{\sin x}$

$\sin^2 x + \cos^2 x = 1$ $\tan^2 x + 1 = \sec^2 x$ $1 + \cot^2 x = \csc^2 x$

$\sin(0) = 0$ $\cos(0) = 1$

Limits

$$\lim_{x \to 0} \frac{\sin x}{x} = 1 \qquad \lim_{x \to 0} \frac{1 - \cos x}{x} = 0 \qquad f'(x) = \lim_{x \to 0} \frac{f(x + \triangle x) - f(x)}{\triangle x}$$

Differentiation

$\frac{d}{dx}(c) = 0$ $\frac{d}{dx}(x) = 1$ $\frac{d}{dx}(cu) = c \cdot \frac{du}{dx}$ $\frac{d}{dx}(u^n) = nu^{n-1} \cdot \frac{du}{dx}$

$\frac{d}{dx}(\sin u) = \cos u \cdot \frac{du}{dx}$ $\frac{d}{dx}(\cos u) = -\sin u \cdot \frac{du}{dx}$ $\frac{d}{dx}\left(f(x) \pm g(x)\right) = f'(x) \pm g'(x)$

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

$\frac{d}{dx}(\tan u) = \sec^2 u \cdot \frac{du}{dx}$ $\frac{d}{dx}(\cot u) = -\csc^2 u \cdot \frac{du}{dx}$ $\frac{d}{dx}(\sec u) = \sec u \tan u \cdot \frac{du}{dx}$

$\frac{d}{dx}(\csc u) = -\csc u \cot u \cdot \frac{du}{dx}$ $\frac{d}{dx}(e^u) = e^u du$ $\frac{d}{dx}(a^u) = \ln(a) a^u du$

$\frac{d}{dx}(\ln u) = \frac{du}{u}$ $\frac{d}{dx}(\log_a u) = \frac{du}{\ln(a) u}$

Sums

$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$ $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$ $\sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4}$ $\sum_{i=1}^{n} c = cn$

Calculus Formulas

Integration

$\int du = u + c$ $\int f(x) \pm g(x)\,dx = \int f(x)\,dx + \int g(x)\,dx$

$\int x^n dx = \frac{x^{n+1}}{n+1} + c$ $\int \sin x\,dx = -\cos x + c$ $\int \cos x\,dx = \sin x + c$

$\int \sec^2 x\,dx = \tan x + c$ $\int \csc^2 x\,dx = -\cot x + c$

$\int \sec x \tan x = \sec x + c$ $\int \csc x \cot x = -\csc x + c$

$\int_a^b f(x)\,dx = F(b) - F(a)$ $f(c) = \frac{1}{b-a}\int_a^b f(x)\,dx$

$\int e^u du = e^u + c$ $\int \frac{du}{u} = \ln u + c$ $\int a^u du = \frac{a^u}{\ln(a)} + c$