Trigonometry Formulas:

Fundamental Identities:

$$\cos^2(x) + \sin^2(x) = 1$$
$$1 + \tan^2(x) = \sec^2(x)$$

Double Angle Formulas:

$$\sin(2x) = 2\sin(x)\cos(x)$$

$$\begin{aligned} \cos(2x) &= \cos^2(x) - \sin^2(x) \\ &= 2\cos^2(x) - 1 \\ &= 1 - 2\sin^2(x). \end{aligned}$$

$$\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$$
$$\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$$

Integrals:

$$\int \sin^2(x)\,dx = \frac{x}{2} - \frac{1}{4}\sin(2x) + C$$

$$\int \cos^2(x)\,dx = \frac{x}{2} + \frac{1}{4}\sin(2x) + C$$

$$\int \sec(x)\,dx = \ln|\sec(x) + \tan(x)| + C$$

$$\int \tan(x)\,dx = -\ln|\cos(x)| + C$$

$$\int \frac{1}{x^2 + a^2}\,dx = \frac{1}{a}\arctan\left(\frac{x}{a}\right) + C$$

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

Series:

$$\begin{aligned} \frac{1}{1-x} &= \sum_{n=0}^{\infty} x^n, \ \forall |x| < 1. \text{ (Geometric Series)} \\ \sum_{n=1}^{\infty} ar^{n-1} &= \frac{a}{1-r}, \quad \text{IFF } |r| < 1. \text{ (Geometric Series)} \\ e^x &= \sum_{n=0}^{\infty} \frac{x^n}{n!}, \ \forall x \in \mathbb{R}. \\ \sin(x) &= \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}. \ \forall x \in \mathbb{R}. \\ \cos(x) &= \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}. \ \forall x \in \mathbb{R}. \\ \arctan(x) &= \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1}, \ \forall |x| < 1. \\ \ln(1+x) &= \sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^n}{n}, \ \forall |x| < 1. \end{aligned}$$

Taylor series of f centered at a : $\displaystyle\sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!}(x-a)^n.$

Maclaurin series of f : $\displaystyle\sum_{n=0}^{\infty} \frac{f^{(n)}(0)}{n!}x^n.$

Arclength:

$$L = \int_a^b \sqrt{1 + \left(f'(x)\right)^2}\,dx.$$

Slope of tangent line to a parametric curve:

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt}.$$