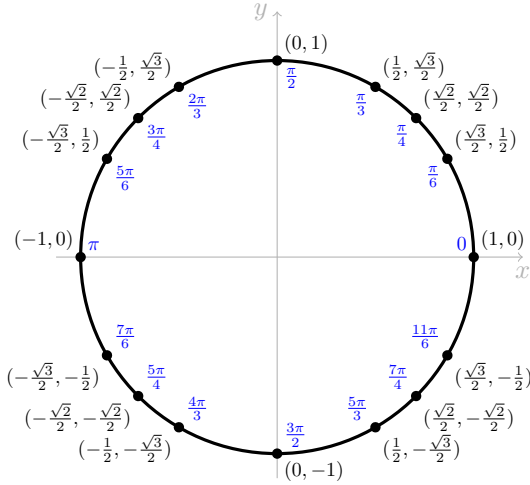


Formula Sheet

Quadratic Formula

$$ax^2 + bx + c = 0 \text{ when } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Common Angles



Secondary Trigonometry Ratios

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

Double-Angle Formulas

$$\sin 2\theta = 2 \cos \theta \sin \theta \quad \cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

Half-Angle Formulas

$$\sin^2 \theta = \frac{1}{2} - \frac{1}{2} \cos 2\theta \quad \cos^2 \theta = \frac{1}{2} + \frac{1}{2} \cos 2\theta$$

Change of Base Formulas

$$a^x = e^{x \ln a} \quad \log_a(x) = \frac{\ln x}{\ln a} \quad (\text{both for any } a > 0)$$

Selected Derivatives

$$\frac{d}{dx} a^u = (a^u \ln a) u' \quad \frac{d}{dx} \log_a(u) = \frac{u'}{u \ln a}$$

$$\frac{d}{dx} \tan u = (\sec^2 u) u' \quad \frac{d}{dx} \sec u = (\sec u \tan u) u'$$

$$\frac{d}{dx} \cot u = -(\csc^2 u) u' \quad \frac{d}{dx} \csc u = -(\csc u \cot u) u'$$

$$\frac{d}{dx} \arcsin u = \frac{u'}{\sqrt{1-u^2}} \quad \frac{d}{dx} \arccos u = \frac{-u'}{\sqrt{1-u^2}}$$

$$\frac{d}{dx} \arctan u = \frac{u'}{1+u^2} \quad \frac{d}{dx} \operatorname{arccot} u = \frac{-u'}{1+u^2}$$

$$\frac{d}{dx} \operatorname{arcsec} u = \frac{u'}{|u|\sqrt{u^2-1}} \quad \frac{d}{dx} \operatorname{arccsc} u = \frac{-u'}{|u|\sqrt{u^2-1}}$$

Selected Integrals

$$\int a^u du = \frac{a^u}{\ln a} + C$$

$$\int \sec u du = \ln |\sec u + \tan u| + C$$

$$\int \csc u du = -\ln |\csc u + \cot u| + C$$

$$\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin \frac{u}{a} + C$$

$$\int \frac{du}{a^2 + u^2} = \frac{1}{a} \arctan \frac{u}{a} + C$$

$$\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a} \operatorname{arcsec} \frac{|u|}{a} + C$$

Riemann Sum

$$A \approx \sum_{k=1}^n f(x_k) \Delta x, \quad \Delta x = \frac{b-a}{n}, \quad x_k = a + k \Delta x$$

Euler's Method

$$y_{n+1} = y_n + F(x_n, y_n) \Delta x, \quad x_n = x_0 + n \Delta x$$

Arc Length

$$L = \int \sqrt{1 + (y')^2} dx \text{ or } L = \int \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$$

Volumes of Revolution

$$V = \int \pi R^2 - \pi r^2 dx \text{ (or } dy), \quad V = \int 2\pi r h dr$$

Average Values of a Region

$$\bar{x} = \frac{1}{A} \int_a^b x[f(x) - g(x)] dx, \quad \bar{y} = \frac{1}{2A} \int_a^b [f^2(x) - g^2(x)] dx$$

Work

$$W = \int F dx \text{ or } W = \int x dF$$

Radius of Convergence (for $\sum_{n=1}^{\infty} a_n(x-c)^n$)

$$R = \lim_{n \rightarrow \infty} \frac{|a_n|}{|a_{n+1}|}$$

Taylor Polynomial and Remainder

$$P_n(x) = \sum_{k=0}^n \frac{f^{(k)}(c)}{k!} (x-c)^k$$

$$R_n(x) = \frac{f^{(n+1)}(z)}{(n+1)!} (x-c)^{n+1} \quad (z \text{ is between } x \text{ \& } c)$$

Important Maclaurin Series

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \quad R = \infty$$

$$\sin x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!} \quad R = \infty$$

$$\cos x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!} \quad R = \infty$$

$$\arctan x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1} \quad R = 1$$

$$\ln(1+x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{n+1}}{n+1} \quad R = 1$$