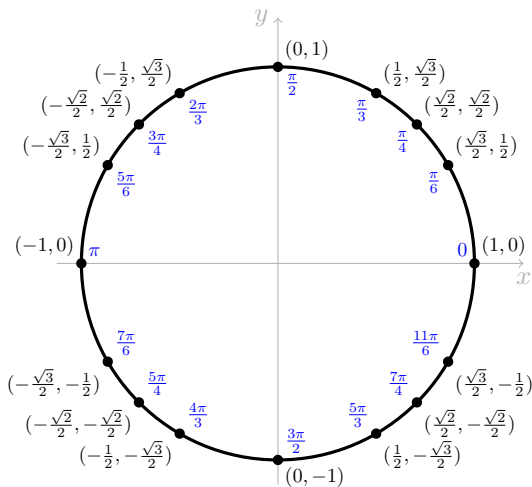


# Formula Sheet

## Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

## Common Angles



## Secondary Trigonometry Ratios

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

## Half-Angle Formulas

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

## 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

$$\begin{aligned} \frac{d}{dx} a^u &= (a^u \ln a) u' & \frac{d}{dx} \log_a(u) &= \frac{u'}{u \ln a} \\ \frac{d}{dx} \tan u &= (\sec^2 u) u' & \frac{d}{dx} \sec u &= (\sec u \tan u) u' \\ \frac{d}{dx} \cot u &= -(\csc^2 u) u' & \frac{d}{dx} \csc u &= -(\csc u \cot u) u' \\ \frac{d}{dx} \arcsin u &= \frac{u'}{\sqrt{1-u^2}} & \frac{d}{dx} \arccos u &= \frac{-u'}{\sqrt{1-u^2}} \\ \frac{d}{dx} \arctan u &= \frac{u'}{1+u^2} & \frac{d}{dx} \operatorname{arccot} u &= \frac{-u'}{1+u^2} \\ \frac{d}{dx} \operatorname{arcsec} u &= \frac{u'}{|u|\sqrt{u^2-1}} & \frac{d}{dx} \operatorname{arccsc} u &= \frac{-u'}{|u|\sqrt{u^2-1}} \end{aligned}$$

## Selected Integrals

$$\begin{aligned} \int a^u du &= \frac{a^u}{\ln a} + C \\ \int \sec u du &= \ln |\sec u + \tan u| + C \\ \int \csc u du &= -\ln |\csc u + \cot u| + C \end{aligned}$$

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

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

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

## Euler's Method

$$\begin{aligned} y_{n+1} &= y_n + F(x_n, y_n) \Delta x \\ x_{n+1} &= x_n + \Delta x \end{aligned}$$

## Arc Length

$$L = \int \sqrt{1 + (y')^2} dx$$

## Volumes of Revolution

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

## Work

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

## Alternating Series Error

$$|S - S_n| \leq a_{n+1}$$

## 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

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

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

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

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

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

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