

# Fundamental Trigonometric Identities

## *Reciprocal Identities*

$$\begin{array}{lll} \sin u = \frac{1}{\csc u} & \cos u = \frac{1}{\sec u} & \tan u = \frac{1}{\cot u} \\ \csc u = \frac{1}{\sin u} & \sec u = \frac{1}{\cos u} & \cot u = \frac{1}{\tan u} \end{array}$$

## *Quotient Identities*

$$\tan u = \frac{\sin u}{\cos u} \qquad \cot u = \frac{\cos u}{\sin u}$$

## *Pythagorean Identities*

$$\begin{array}{lll} \sin^2 u + \cos^2 u = 1 & 1 + \tan^2 u = \sec^2 u & 1 + \cot^2 \theta = \csc^2 \theta \\ (\sin^2 u = 1 - \cos^2 u) & (\tan^2 u = \sec^2 u - 1) & (\cot^2 \theta = \csc^2 \theta - 1) \\ (\cos^2 u = 1 - \sin^2 u) & (\sec^2 u - \tan^2 u = 1) & (\csc^2 \theta - \cot^2 \theta = 1) \end{array}$$

## *Cofunction Identities\**

$$\begin{array}{lll} \sin\left(\frac{\pi}{2} - u\right) = \cos u & \csc\left(\frac{\pi}{2} - u\right) = \sec u & \cot\left(\frac{\pi}{2} - u\right) = \tan u \\ \cos\left(\frac{\pi}{2} - u\right) = \sin u & \sec\left(\frac{\pi}{2} - u\right) = \csc u & \tan\left(\frac{\pi}{2} - u\right) = \cot u \end{array}$$

\* 90° can be substituted for  $\frac{\pi}{2}$  in the cofunction identities.

## *Even/Odd Identities*

$$\begin{array}{ll} \sin(-u) = -\sin u & \csc(-u) = -\csc u \\ \cos(-u) = \cos u & \sec(-u) = \sec u \\ \tan(-u) = -\tan u & \cot(-u) = -\cot u \end{array}$$