Definitions of Trigonometric Functions of Any Angle

Let θ be an angle in standard position with (x, y) a point on the terminal side of θ and

$r = \sqrt{x^2 + y^2} \neq 0.$
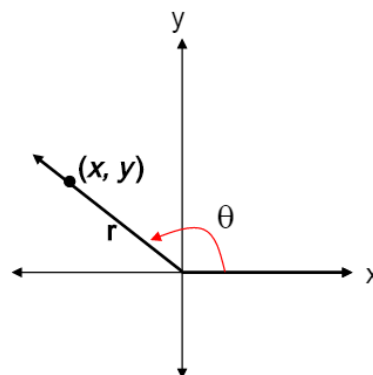
$$\sin\theta = \frac{y}{r} \qquad\qquad \cos = \frac{x}{r}$$

$$\tan\theta = \frac{y}{x}, \quad x \neq 0 \qquad\qquad \cot\theta = \frac{x}{y}, \quad y \neq 0$$

$$\sec\theta = \frac{r}{x}, \quad x \neq 0 \qquad\qquad \csc\theta = \frac{r}{y}, \quad y \neq 0$$
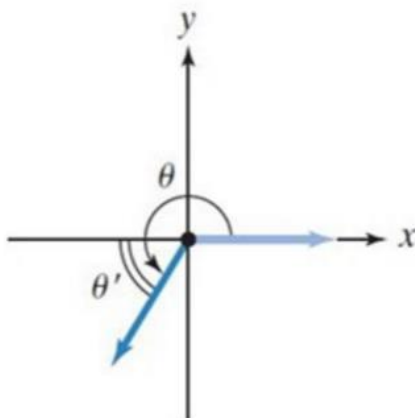
Definition of Reference Angle

Let θ be an angle in standard position. Its reference angle is the acute angle θ' formed by the terminal side of θ and the horizontal axis.
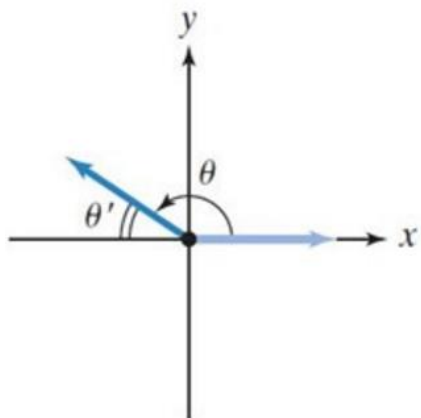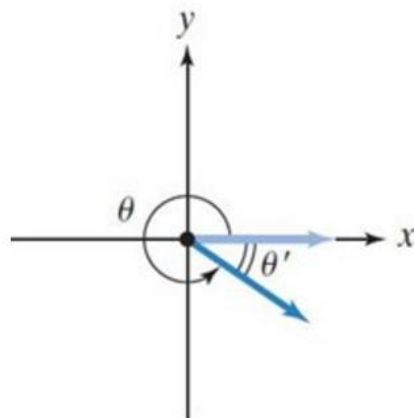
$\theta' = \pi - \theta$ (radians) $\theta' = \theta - \pi$ (radians) $\theta' = 2\pi - \theta$ (radians)

$\theta' = 180° - \theta$ (degrees) $\theta' = \theta - 180°$ (degrees) $\theta' = 360° - \theta$ (degrees)

Evaluating Trigonometric Functions of Any Angle

To find the value of a trigonometric function of any angle θ.

1. Determine the function value for the associated reference angle θ'.
2. Depending on the quadrant in which θ lies, affix the appropriate sign to the function value.