TRIGONOMETRY

DEFINITION

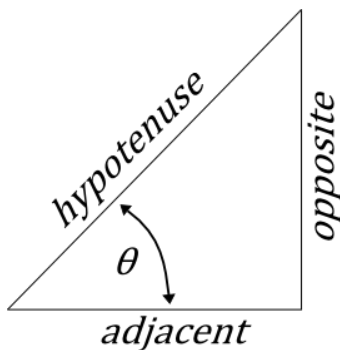### RIGHT TRIANGLE DEFINITION

$$\sin\theta = \frac{opposite}{hypotenuse} \qquad \csc\theta = \frac{hypotenuse}{opposite}$$

$$\cos\theta = \frac{adjacent}{hypotenuse} \qquad \sec\theta = \frac{hypotenuse}{adjacent}$$

$$\tan\theta = \frac{opposite}{adjacent} \qquad \cot\theta = \frac{adjacent}{opposite}$$

TRIG FUNCTIONS RANGE

$$-1 \le \sin\theta \le 1$$

$$-1 \le \cos\theta \le 1$$

$$-\infty \le \tan\theta \le \infty$$

$$\csc\theta \ge 1 \text{ and } \csc\theta \le -1$$

$$\sec\theta \ge 1 \text{ and } \sec\theta \le -1$$

$$-\infty \le \cot\theta \le \infty$$
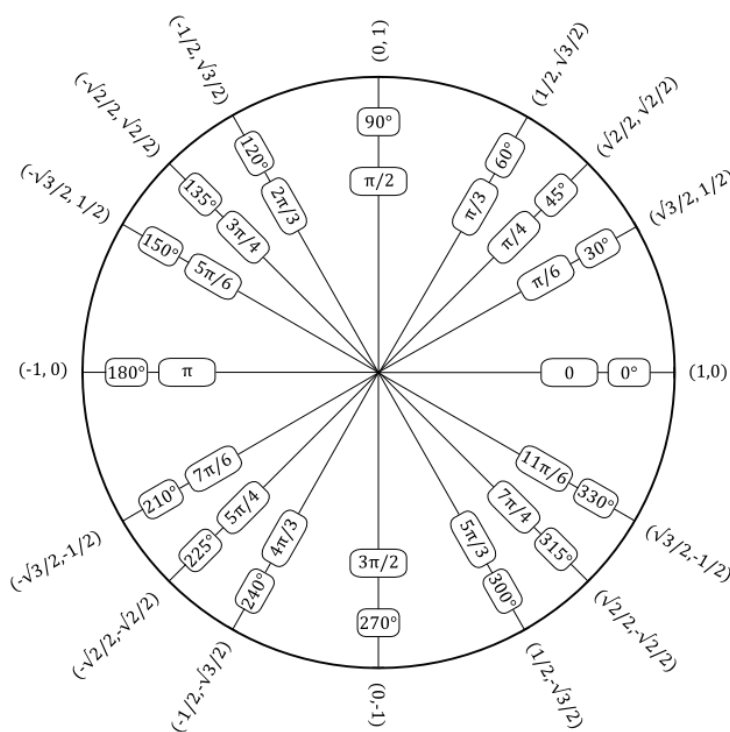
UNIT CIRCLE DEFINITION

$$\sin\theta = y$$

$$\cos\theta = x$$

$$\tan\theta = \frac{y}{x}$$

$$\csc\theta = \frac{1}{y}$$

$$\sec\theta = \frac{1}{x}$$

$$\cot\theta = \frac{x}{y}$$

TRIG FUNCTIONS DOMAIN

$$\sin\theta, \quad \theta \text{ can be any angle}$$

$$\cos\theta, \quad \theta \text{ can be any angle}$$

$$\tan\theta, \quad \theta \ne \left(n + \frac{1}{2}\right)\pi, \qquad n = 0, \pm1, \pm2, \ldots$$

$$\csc\theta, \quad \theta \ne n\pi, \qquad n = 0, \pm1, \pm2, \ldots$$

$$\sec\theta, \quad \theta \ne \left(n + \frac{1}{2}\right)\pi, \qquad n = 0, \pm1, \pm2, \ldots$$

$$\cot\theta, \quad \theta \ne n\pi, \qquad n = 0, \pm1, \pm2, \ldots$$

TRIG FUNCTIONS PERIOD

$$\sin(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\cos(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\tan(\omega\theta) \rightarrow T = \frac{\pi}{\omega}$$

$$\csc(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\sec(\omega\theta) \rightarrow T = \frac{2\pi}{\omega}$$

$$\cot(\omega\theta) \rightarrow T = \frac{\pi}{\omega}$$

INVERSE TRIG FUNCTION NOTATION

$$\sin^{-1}x \equiv \arcsin x \equiv \text{Asin}\, x$$

$$\cos^{-1}x \equiv \arccos x \equiv \text{Acos}\, x$$

$$\tan^{-1}x \equiv \arctan x \equiv \text{Atan}\, x$$

INVERSE TRIG DOMAIN

$$\sin^{-1}x : -1 \le x \le 1$$

$$\cos^{-1}x : -1 \le x \le 1$$

$$\tan^{-1}x : -\infty \le x \le \infty$$

INVERSE TRIG FUNCTION RANGE

$$-\frac{\pi}{2} \le \sin^{-1}x \le \frac{\pi}{2}$$

$$0 \le \cos^{-1}x \le \pi$$

$$-\frac{\pi}{2} \le \tan^{-1}x \le \frac{\pi}{2}$$