

REVIEW OF TRIGONOMETRIC VALUES & FUNCTIONS

Conversion between radians and degrees when radians are given in terms of “ π ”

DEGREES \rightarrow RADIANS: The official formula is $\theta^\circ \cdot \frac{\pi}{180^\circ} = \theta$ radians

Ex. Convert 120° into radians \rightarrow SOLUTION: $120^\circ \cdot \frac{\pi}{180^\circ} = \frac{2\pi}{3}$ radians

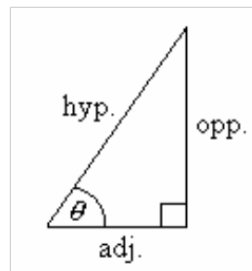
RADIANS \rightarrow DEGREES: The conversion formula is θ radians $\cdot \frac{180^\circ}{\pi} = \theta^\circ$

Ex. Convert $\frac{\pi}{5}$ into degrees. \rightarrow SOLUTION: $\frac{\pi}{5} \cdot \frac{180^\circ}{\pi} = \frac{180^\circ}{5} = 36^\circ$

The Trigonometric Ratios

The six trigonometric ratios are defined in the following way based on this right triangle and the angle θ

adj. = adjacent side to angle θ
 opp. = opposite side to angle θ
 hyp. = hypotenuse of the right triangle



SOH CAH TOA \rightarrow $\sin \theta = \frac{\text{opp.}}{\text{hyp.}}$ $\cos \theta = \frac{\text{adj.}}{\text{hyp.}}$ $\tan \theta = \frac{\text{opp.}}{\text{adj.}}$

Reciprocal functions \rightarrow $\csc \theta = \frac{\text{hyp.}}{\text{opp.}}$ $\sec \theta = \frac{\text{hyp.}}{\text{adj.}}$ $\cot \theta = \frac{\text{adj.}}{\text{opp.}}$

Table of Values of Sine, Cosine, and Tangent Functions at Popular Angles

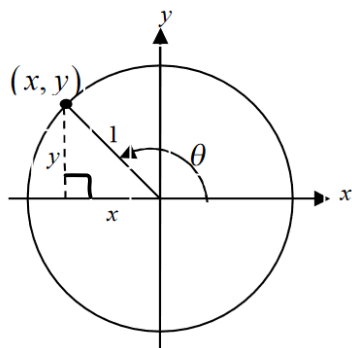
rad	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{3\pi}{2}$	2π
degree	0°	30°	45°	60°	90°	120°	135°	150°	180°	270°	360°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	0	1
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	-	0

The Unit Circle

The best way of recalling all of the trigonometric values of the sine and cosine functions is to visualize the unit circle.

Unit circle definition

For this definition θ is any angle.



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

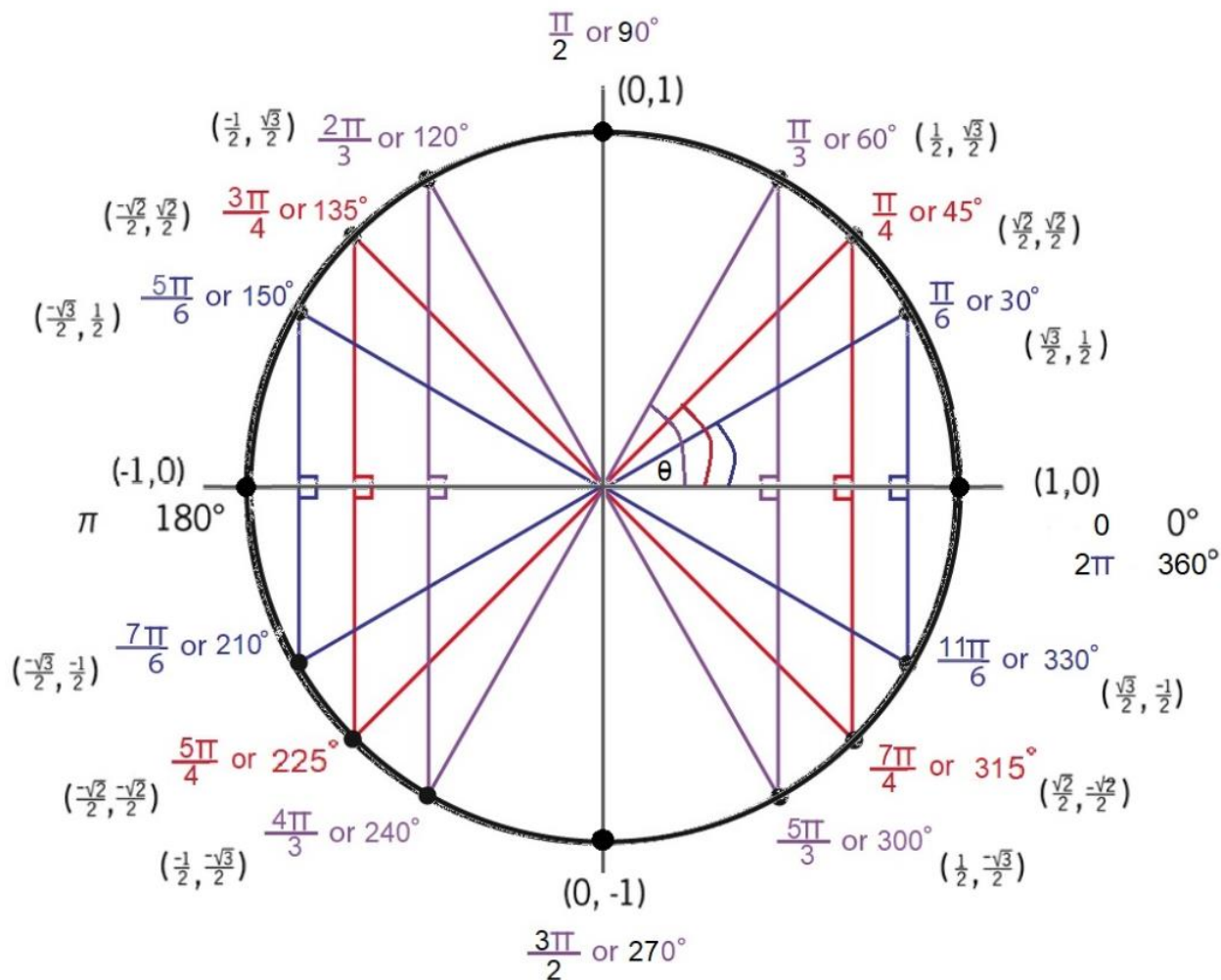
$$\cos \theta = \frac{x}{1} = x \quad \sec \theta = \frac{1}{x}$$

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

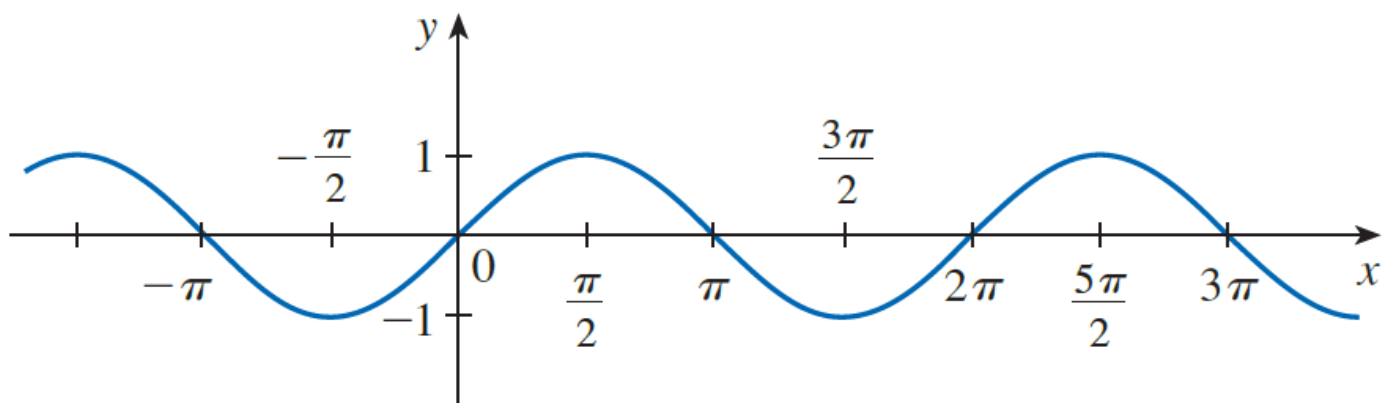
The points (x,y) on the unit circle satisfy

$$x = \cos(\theta)$$

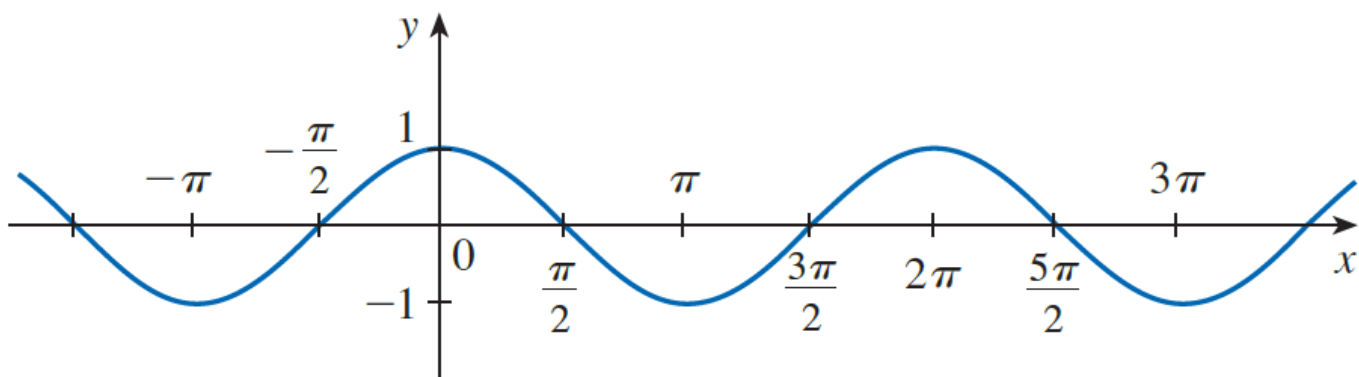
$$y = \sin(\theta).$$



Graphs of Trigonometric Functions



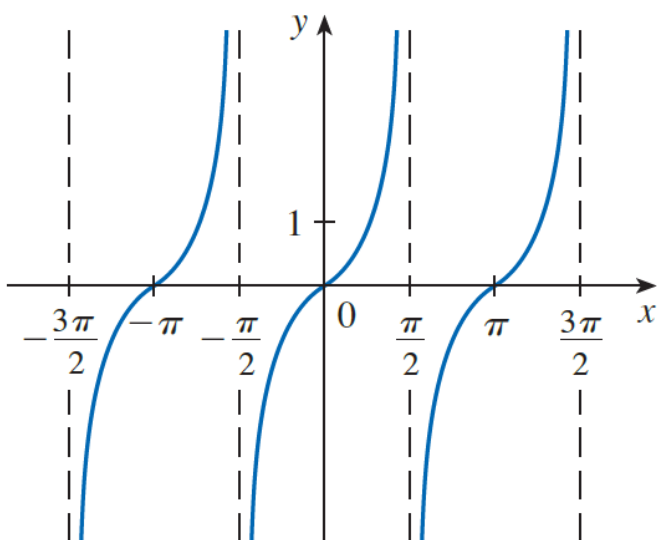
$$f(\theta) = \sin(\theta)$$



$$f(\theta) = \cos(\theta)$$

Notice that

$$-1 \leq \sin x \leq 1 \quad -1 \leq \cos x \leq 1$$



$$f(\theta) = \tan(\theta)$$