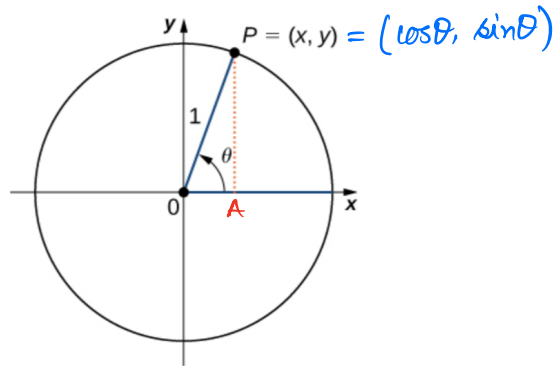


Basic Trigonometric Functions:

Let $P(x, y)$ be a point on a unit circle, centred at $O(0, 0)$.



$OA = x = \text{Adjacent Side}$

$AP = y = \text{Opposite Side}$

$OP = 1 = \text{Hypotenuse}$

$\triangle OAP$ is right triangle

$$\Downarrow$$
$$OA^2 + AP^2 = OP^2$$

Sine function : $f(\theta) = \sin \theta$

$$\sin \theta = \frac{\text{OPP}}{\text{HYP}} = \frac{y}{1} = y$$

Cosine function : $f(\theta) = \cos(\theta)$

$$\cos \theta = \frac{\text{ADJ}}{\text{HYP}} = \frac{x}{1} = x$$

Tangent function : $f(\theta) = \tan \theta$

$$\tan \theta = \frac{\text{OPP}}{\text{ADJ}} = \frac{y}{x} = \frac{\sin \theta}{\cos \theta}$$

not defined
for $x = 0$

Cosecant function : $f(\theta) = \csc \theta$

$$\csc \theta = \frac{\text{HYP}}{\text{OPP}} = \frac{1}{y} = \frac{1}{\sin \theta}$$

not defined
for $y=0$

Secant function : $f(\theta) = \sec \theta$

$$\sec \theta = \frac{\text{HYP}}{\text{ADJ}} = \frac{1}{x} = \frac{1}{\cos \theta}$$

not defined
for $x=0$

Cotangent function :

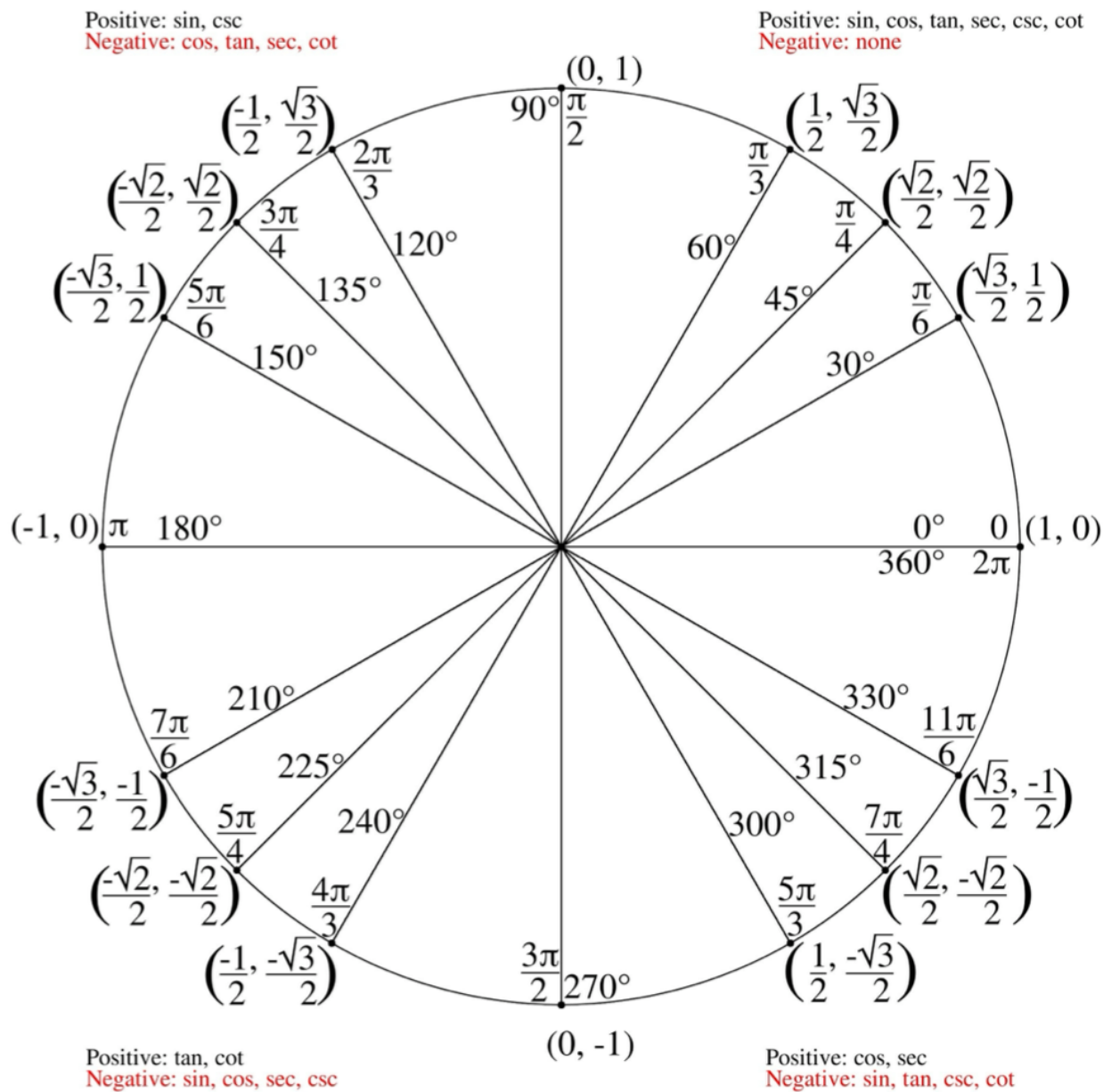
$$\cot \theta = \frac{\text{ADJ}}{\text{OPP}} = \frac{x}{y} = \frac{1}{\tan \theta}$$

not defined
for $y=0$

Sin θ & Cos θ Value-table

θ	$\sin \theta$	$\cos \theta$
0	0	1
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
$\frac{\pi}{2}$	1	0

The Unit Circle



Pythagorean Identities

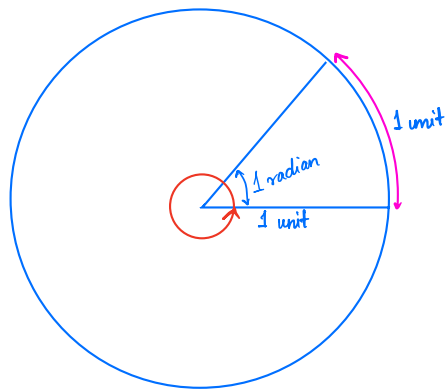
$$\textcircled{1} \sin^2 \theta + \cos^2 \theta = 1$$

$$\textcircled{2} 1 + \tan^2 \theta = \sec^2 \theta$$

$$\textcircled{3} 1 + \cot^2 \theta = \csc^2 \theta$$

Radian: The trigonometric functions are measured with radians.

$$1 \text{ radian} = \frac{1 \text{ unit arc length}}{1 \text{ unit radius length}} \left\{ \text{for an unit circle} \right.$$



$$\leftarrow \begin{aligned} \text{Circumference} &= 2\pi \\ \text{Radius} &= 1 \end{aligned}$$

$$360^\circ = \frac{2\pi}{1} \text{ radians}$$

$$\Rightarrow \boxed{180^\circ = \pi \text{ radian}}$$

Graph of Trigonometric Functions

