

Date: 3/19/24

Objective: I can use the unit circle.

Finding Sine, Cosine, and Tangent on the Unit Circle

You can use the (x,y) coordinates on the unit circle to solve for the sin, cos, and tan.

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{y}{1} = y$$

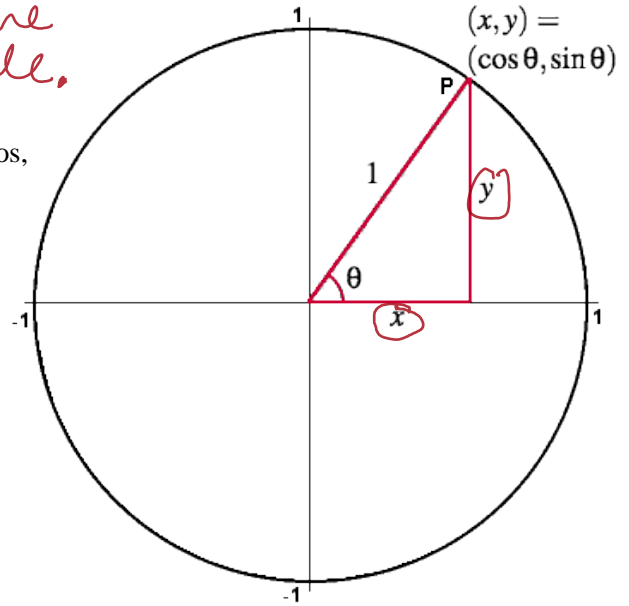
$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{x}{1} = x$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{y}{x}$$

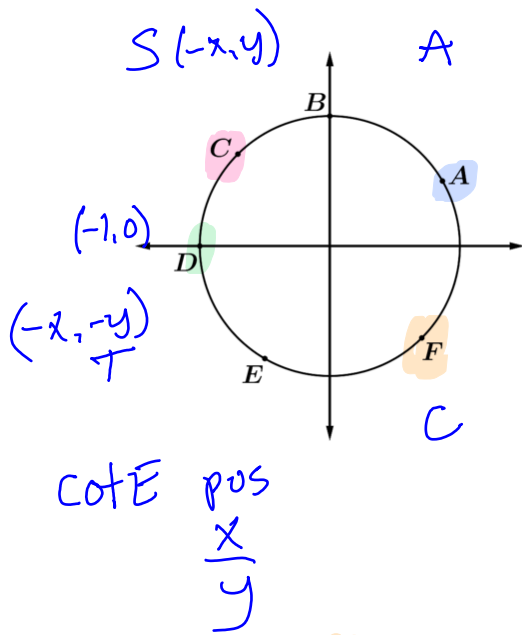
$$\csc \theta = \frac{\text{hyp}}{\text{opp}} = \frac{1}{y}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}} = \frac{1}{x}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}} = \frac{x}{y}$$



Example: Refer to the diagram below. For the indicated point, tell if the value for each trigonometric function is positive, negative, neither (zero), or undefined. Write the value of the trig function using x and/or y.



a) $\sin A$
Pos, Neg, Zero, or Und?
Value: y

b) $\cos C$
Pos, Neg, Zero, or Und?
Value: x

c) $\tan C$
Pos, Neg, Zero, or Und?
Value: $\frac{y}{x}$

d) $\cot D$
Pos, Neg, Zero, or Und?
Value: $\frac{x}{y}$

e) $\tan D$
Pos, Neg, Zero, or Und?
Value: $\frac{y}{x}$

f) $\sec F$
Pos, Neg, Zero, or Und?
Value: $\frac{1}{x}$

State the angle in **degrees** represented by the given coordinate point.

1. $(\frac{\sqrt{3}}{2}, -\frac{1}{2})$ 110 $(+,-)$
 330°

2. $(-1, 0)$ $axis$
 180°

3. $(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$ 111
 225°

State the angle in **radians** represented by the given coordinate point.

1. $(\frac{\sqrt{3}}{2}, -\frac{1}{2})$ 110
 $\frac{11\pi}{6}$

2. $(0, 1)$ $axis$
 $\frac{\pi}{2}$

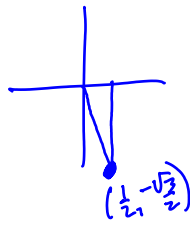
3. $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
 $\frac{\pi}{4}$

Practice: Draw the angle. Use the unit circle to identify the requested trig ratios.

1. $\sin 30^\circ =$ _____

$\cos 30^\circ =$ _____

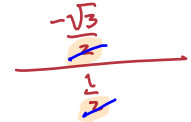
$\tan 30^\circ =$ _____



3. $y = \sin -\frac{\pi}{3} =$ $-\frac{\sqrt{3}}{2}$

$x = \cos -\frac{\pi}{3} =$ $\frac{1}{2}$

$\frac{y}{x} = \tan -\frac{\pi}{3} =$ $-\sqrt{3}$



2. $\sin -150^\circ =$ $-\frac{1}{2}$

$\cos -150^\circ =$ $-\frac{\sqrt{3}}{2}$

$\tan -150^\circ =$ $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$



4. $\sin \frac{\pi}{2} =$ 1

$\csc \frac{\pi}{2} =$ 1

$\cos \frac{\pi}{2} =$ 0

$\sec \frac{\pi}{2} =$ undef

$\tan \frac{\pi}{2} =$ undef

$\cot \frac{\pi}{2} =$ 0

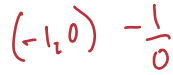
Find the exact value of each trig function using the unit circle as a reference.

1. $\tan \pi =$ 0

2. $\cot \pi =$ undef

3. $\csc 150^\circ =$ 2

4. $\csc -150^\circ =$ -2



5. $\sec 30^\circ =$ $\frac{2}{\sqrt{3}}$ or $\frac{2\sqrt{3}}{3}$

6. $\sec \frac{3\pi}{4} =$ _____

7. $\csc 180^\circ =$ _____

8. $\sec \frac{3\pi}{2} =$ _____

