

# 1.4 - Evaluating Trigonometric Functions

1/9

## Warmup

$$1. \cos(-60^\circ) \quad \frac{1}{2}$$

$$2. \sin\left(-\frac{\pi}{6}\right) \quad -\frac{1}{2}$$

$$3. \sin\left(\frac{22\pi}{3}\right) \quad -\frac{\sqrt{3}}{2}$$

$$4. \cos(1560^\circ) \quad -\frac{1}{2}$$

# Chapter 2

## Trigonometric Functions

1. Angles in the Cartesian Plane
2. The Cartesian Plane
3. **Evaluate Trig Functions for Non-acute Angles**
4. Basic Trigonometric Identities

## 2.3 - Evaluate Trig Functions for Non-acute Angles

2/9

Find the values of the six trigonometric functions of an angle  $\theta$  in standard position whose terminal side passes through  $(8, -15)$

$$\sin \theta = -\frac{15}{17} \quad \cos \theta = \frac{8}{17} \quad \tan \theta = -\frac{15}{8}$$

$$\csc \theta = -\frac{17}{15} \quad \sec \theta = \frac{17}{8} \quad \cot \theta = -\frac{8}{15}$$

## 2.3 - Evaluate Trig Functions for Non-acute Angles

3/9

**Practice** - Find the values of the six trigonometric functions of an angle  $\theta$  in standard position whose terminal side passes through the given point.

1. P(-5, 12)

$$\sin \theta = \frac{12}{13}$$

$$\csc \theta = \frac{13}{12}$$

$$\cos \theta = -\frac{5}{13}$$

$$\sec \theta = -\frac{13}{5}$$

$$\tan \theta = -\frac{12}{5}$$

$$\cot \theta = -\frac{5}{12}$$

2. P(-8, -15)

$$\sin \theta = -\frac{15}{17}$$

$$\csc \theta = -\frac{17}{15}$$

$$\cos \theta = -\frac{8}{17}$$

$$\sec \theta = -\frac{17}{8}$$

$$\tan \theta = \frac{15}{8}$$

$$\cot \theta = \frac{8}{15}$$

## 2.3 - Evaluate Trig Functions for Non-acute Angles

4/9

Find the reference angle  $\alpha$  for the given angle  $\theta$ .

$$\theta = 140^\circ$$

$$\alpha = 40^\circ$$

$$\theta = 300^\circ$$

$$\alpha = 60^\circ$$

$$\theta = -135^\circ$$

$$\alpha = 45^\circ$$

---

Practice

$$a. \theta = 126^\circ$$

$$\alpha = 54^\circ$$

$$b. \theta = 659^\circ$$

$$\alpha = 61^\circ$$

$$c. \theta = -725^\circ$$

$$\alpha = 5^\circ$$

## 2.3 - Evaluate Trig Functions for Non-acute Angles

5/9

Rewrite the function as one for a reference angle.

$$a. \sin 121^\circ$$

$$\sin 59^\circ$$

$$b. \csc 313^\circ$$

$$-\csc 47^\circ$$

$$c. \tan 538^\circ$$

$$-\tan 2^\circ$$

---

Practice

$$a. \cos 216^\circ$$

$$-\cos 36^\circ$$

$$b. \csc(-106^\circ)$$

$$-\csc 74^\circ$$

$$c. \cot 287^\circ$$

$$-\cot 73^\circ$$

## 2.3 - Evaluate Trig Functions for Non-acute Angles

6/9

Find the values of the other five trigonometric functions of  $\theta$  if  $\cos \theta = -\frac{2}{5}$  is in the third quadrant.

$$\sin \theta = -\frac{\sqrt{21}}{5} \quad \csc \theta = -\frac{5\sqrt{21}}{21} \quad \sec \theta = -\frac{5}{2} \quad \tan \theta = \frac{\sqrt{21}}{2} \quad \cot \theta = \frac{2\sqrt{21}}{21}$$

---

### Practice

1.  $\cos \theta = \frac{2}{3}, 0^\circ < \theta < 270^\circ$

$$\sec \theta = \frac{3}{2} \quad \tan \theta = \frac{\sqrt{5}}{2}$$

$$\sin \theta = \frac{\sqrt{5}}{3} \quad \cot \theta = \frac{2\sqrt{5}}{5}$$

$$\csc \theta = \frac{3\sqrt{5}}{5}$$

2.  $\tan \theta = -\frac{3}{4}, \cos \theta < 0$

$$\cos \theta = -\frac{4}{5} \quad \sec \theta = -\frac{5}{4}$$

$$\sin \theta = \frac{3}{5} \quad \cot \theta = -\frac{4}{3}$$

$$\csc \theta = \frac{5}{3}$$

## 2.3 - Evaluate Trig Functions for Non-acute Angles

7/9

Find the exact value of  $\tan 495^\circ$ .

$-1$

---

Practice

*a.*  $\csc 480^\circ$

$$\frac{2\sqrt{3}}{3}$$

*b.*  $\cot 2475^\circ$

$-1$

*c.*  $\sin(-1410^\circ)$

$$\frac{1}{2}$$



## 2.3 - Evaluate Trig Functions for Non-acute Angles

8/9

What is the range of the trig functions?

$$\sin \theta \quad [-1, 1]$$

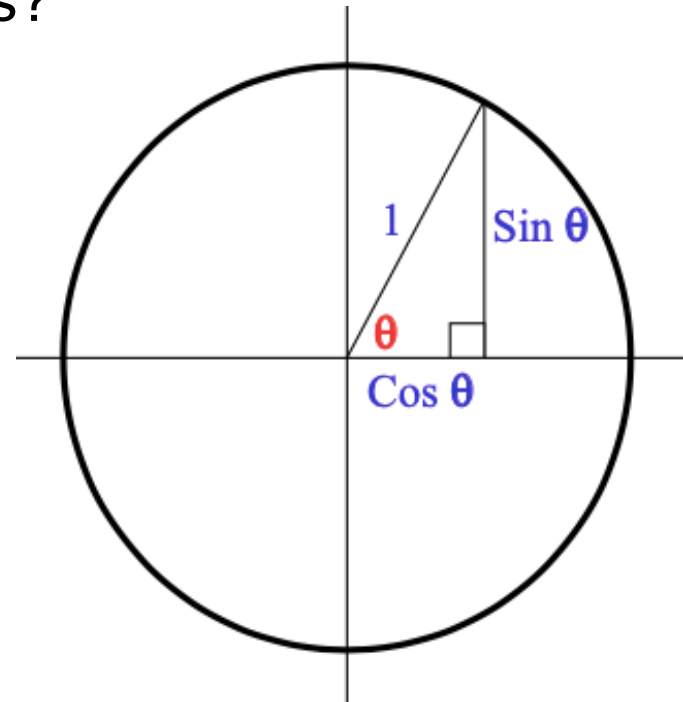
$$\cos \theta \quad [-1, 1]$$

$$\tan \theta \quad (-\infty, \infty)$$

$$\cot \theta \quad (-\infty, \infty)$$

$$\csc \theta \quad (-\infty, -1] \cup [1, \infty)$$

$$\sec \theta \quad (-\infty, -1] \cup [1, \infty)$$



## 2.3 - Evaluate Trig Functions for Non-acute Angles

9/9

Trig function ranges

$$\sin \theta \quad [-1, 1] \qquad \csc \theta \quad (-\infty, -1] \cup [1, \infty)$$

$$\cos \theta \quad [-1, 1] \qquad \sec \theta \quad (-\infty, -1] \cup [1, \infty)$$

$$\tan \theta \quad (-\infty, \infty) \qquad \cot \theta \quad (-\infty, \infty)$$

---

**Practice** - Are these possible?

$$a. \sin \theta = \sqrt{2}$$

Not possible

$$b. \cot \theta = 32.58$$

Possible

$$c. \csc \theta = \frac{\sqrt{3}}{2}$$

Not possible

