Trigonometry

How to answer questions

Evaluate the trigonometric functions of the quadrant angle, if possible
- Radians

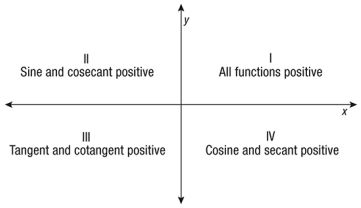
Reference Angle
- Degrees/Radians will be specified
- Always acute
- Always positive
- Between x-axis and terminal side

Find two solutions of the equation. Give your answers in degrees ($0° \leq \theta < 360°$) and in radians ($0 \leq \theta < 2\pi$). Do not use a calculator. $\sin(\theta) = -\frac{1}{2}$
- Always positive
- Two answers
- Exact values, draw circle

Find the value of the expression, if possible $\sin^{-1}(-\frac{\sqrt{3}}{2})$ or $\arcsin(-\frac{\sqrt{3}}{2})$
- Radians assumed, unless specified otherwise
- Exact = Picture, Round = Calculator
- Positive or negative

Basic Trigonometric Functions

$$sin = \frac{y}{r} \qquad csc = \frac{r}{y}$$
$$cos = \frac{x}{r} \qquad sec = \frac{r}{x}$$
$$tan = \frac{y}{x} \qquad cot = \frac{x}{y}$$



Graphing Trigonometric Functions

Assume...

- $y = d + a * trig(bx - c)$
- Amplitude = $|a|$
- Vertical Shift = d
- Phase Shift = $\frac{c}{b}$
- X-Scale (change between critical points) = $\frac{\text{period}}{4}$
- Period depends on what functions
- sin, cos, csc, sec = $\frac{2\pi}{b}$
- tan, cot = $\frac{\pi}{b}$

For deriving from a word problem

- $c = b *$ shift
- b depends on what functions
- sin, cos, csc, sec = $\frac{2\pi}{\text{period}}$
- tan, cot = $\frac{\pi}{\text{period}}$

Examples...

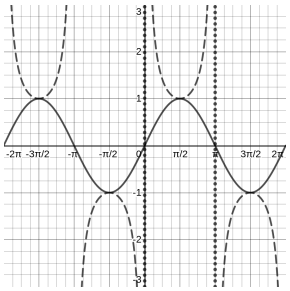


Figure 1: $y = \sin(x), y = \csc(x)$

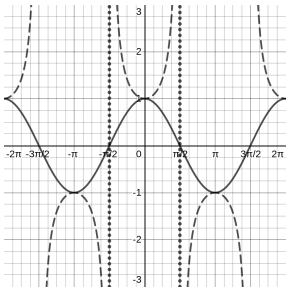


Figure 2: $y = \cos(x), y = \sec(x)$

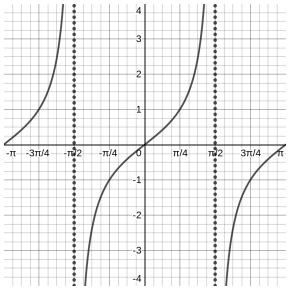


Figure 3: $y = \tan(x)$

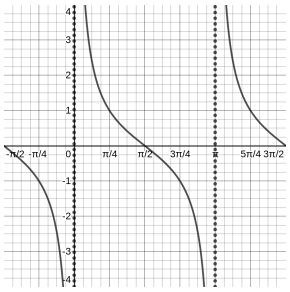


Figure 4: $y = \cot(x)$

Trigonometric Identities

$$\sin = \frac{1}{\csc} \qquad \csc = \frac{1}{\sin}$$
$$\cos = \frac{1}{\sec} \qquad \sec = \frac{1}{\cos}$$
$$\tan = \frac{\sin}{\cos} \qquad \cot = \frac{\cos}{\sin}$$

$$\sin^2 + \cos^2 = 1$$
$$1 + \tan^2 = \sec^2$$
$$1 + \cot^2 = \csc^2$$

Arcs

In **radians** unless specified otherwise
Exact $\implies$ picture
Round $\implies$ calculator ($\sin^{-1}$)

$$\sin(\theta) = -\frac{\sqrt{3}}{2}$$
$$\sin^{-1}(-\frac{\sqrt{3}}{2})$$
$$\arcsin(-\frac{\sqrt{3}}{2})$$