

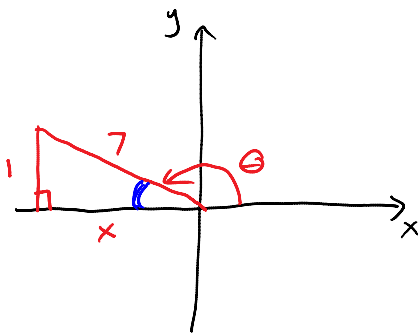
Section 6.3:

Wednesday, January 14, 2015
12:30 PM

example: Given that $\sin \theta = \frac{1}{7}$ and $\tan \theta$ is negative, calculate the values of the remaining 5 trig functions. Give exact answers.

step #1: determine the quadrant

$$\begin{array}{l} \sin \theta \quad + \quad \rightarrow \text{QI or } \textcircled{\text{II}} \\ \tan \theta \quad - \quad \rightarrow \textcircled{\text{II}} \text{ or } \textcircled{\text{IV}} \end{array} \quad \therefore \text{QII}$$



step #2: find remaining side

$$\sin \theta = \frac{1}{7}$$

use Pythagoras to find the remaining side

$$a^2 + b^2 = c^2$$

$$1 + x^2 = 49$$

$$x^2 = 48$$

$$x = \pm \sqrt{48} = -4\sqrt{3}$$

because QII

step #3: write all the remaining trig functions

$$\sin \theta = \frac{1}{7}$$

$$\cos \theta = \frac{-4\sqrt{3}}{7}$$

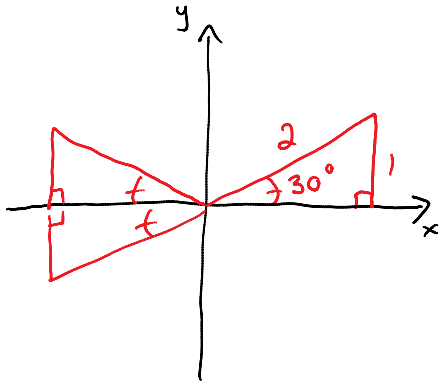
$$\tan \theta = \frac{1}{-4\sqrt{3}} = -\frac{\sqrt{3}}{12}$$

$$\csc \theta = 7$$

$$\sec \theta = \frac{-7}{4\sqrt{3}} = \frac{-7\sqrt{3}}{12}$$

$$\cot \theta = -4\sqrt{3}$$

example: calculate $\sin 30^\circ$, $\sin 150^\circ$, $\sin 210^\circ$ and $\sin 330^\circ$



$$\sin 30^\circ = \frac{1}{2}$$

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

$$\sin 210^\circ = -\frac{1}{2}$$

$$\sin 330^\circ = -\frac{1}{2}$$

a) if $\sin \theta = \frac{1}{2}$ and θ is acute, calculate θ .

from our diagram, $\theta = 30^\circ$

b) if $\sin \theta = \frac{1}{2}$ and $0 \leq \theta \leq 180^\circ$, calculate θ .

$$\theta = 30^\circ, 150^\circ \quad \{30^\circ, 150^\circ\}$$

c) if $\sin \theta = \frac{1}{2}$ and $180^\circ \leq \theta \leq 360^\circ$, calculate θ .

~~$\theta = 210^\circ, 330^\circ$~~

d) if $\sin \theta = \frac{1}{2}$ and θ is in QI, calculate θ .

$$\theta = 30^\circ \text{ or coterminial}$$

$$= 30^\circ + n \cdot 360^\circ, \text{ where } n \text{ is an integer}$$

e) if $\sin \theta = \frac{1}{2}$, calculate θ .

$$\theta = \begin{cases} 30^\circ \text{ or coterminial} \\ 150^\circ \text{ or coterminial} \end{cases}$$

note: the arcsine function $\sin^{-1} x$ returns values in QI and QIV only (plus quadrantals)

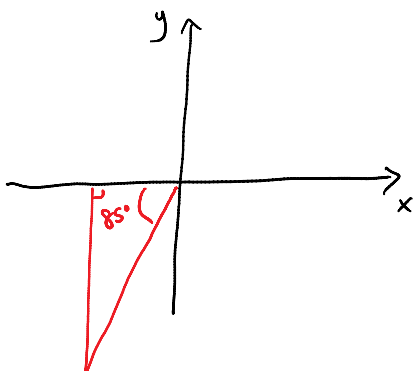
in QI and QIV only (plus quadrants)

if $\theta = \sin^{-1}x$, then $-90^\circ \leq \theta \leq 90^\circ$

example: if $\tan \theta = 11$ ^(eleven) and θ is in QIII, calculate θ . Round to nearest integer.

step #1: find reference angle

$$\tan^{-1} 11 = 85^\circ$$

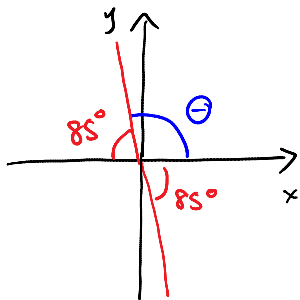


step #2: draw diagram and LOOK AT IT

$$\begin{aligned}\theta &= (180^\circ + 85^\circ) \\ &= 265^\circ \text{ or coterminal}\end{aligned}$$

$$\text{or } \theta = -95^\circ \text{ or coterminal}$$

example: if $\tan \theta = -11$ and $0 \leq \theta < 360^\circ$, calculate θ . Round to nearest integer.



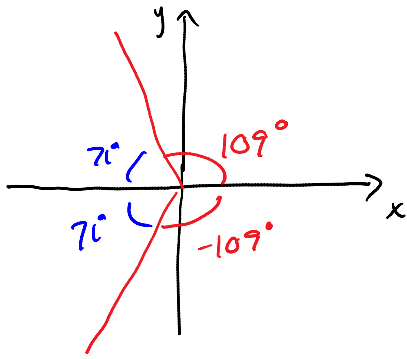
$$\tan^{-1}(-11) = -85^\circ$$

ref angle is 85°

went QII and QIV

$$\theta = 95^\circ, 275^\circ$$

example: if $\cos \theta = -0.32$, calculate θ . Round to nearest integer.



$$\cos^{-1}(-0.32) = 109^\circ$$

$$\theta = \begin{cases} 109^\circ & \text{or coterminal} \\ -109^\circ & \text{or "} \end{cases}$$