Section 13-8: The Reciprocal Trig Functions

Cotangent: $\cot\theta = \frac{1}{\tan\theta} = \frac{x}{y} = \frac{\cos\theta}{\sin\theta}$

Secant: $\sec\theta = \frac{1}{\cos\theta} = \frac{1}{x}$

Cosecant: $\csc\theta = \frac{1}{\sin\theta} = \frac{1}{y}$

Use your calculator to find the value of each to the nearest hundredth.

$\cos(131°) = -0.66$

$\tan\frac{8\pi}{27} = 1.34$

$\csc(-75°) = -1.04$

$\frac{1}{\sin(-75°)}$

$\cot\frac{-4\pi}{13} = -0.69$

$\frac{1}{\tan\frac{-4\pi}{13}}$

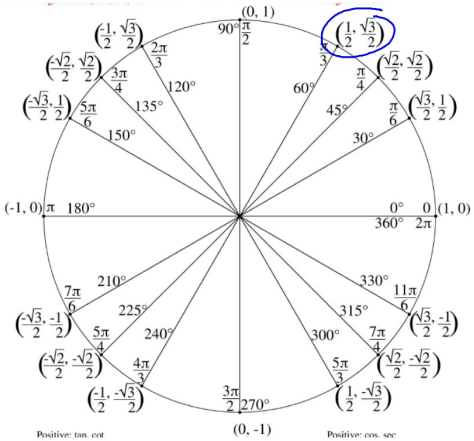
$\sec 14 = 7.31$ radians

$\frac{1}{\cos 14}$

Use the Unit Circle to find the exact value of each.

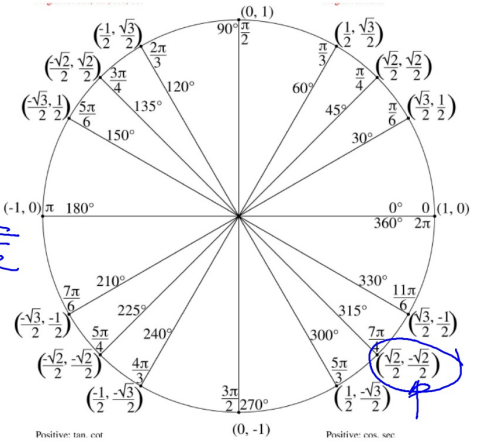
1. $\sec 60°$

$\frac{1}{\cos 60°} = \frac{1}{\frac{1}{2}} = 2$



2. $\csc\frac{7\pi}{4}$

$\frac{1}{-\frac{\sqrt{2}}{2}} = -\frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-2\sqrt{2}}{2} = -\sqrt{2}$



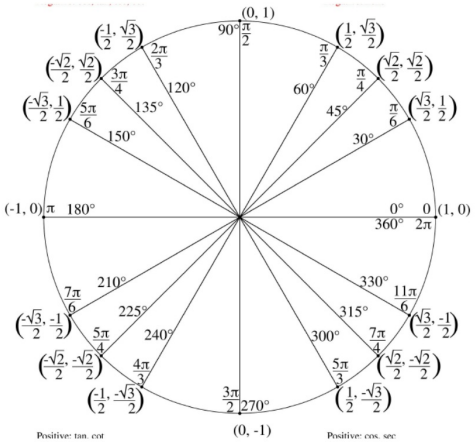
Use the Unit Circle to find the exact value of each.

3. $\text{Cot}\,16\pi$

$$\frac{1}{\frac{y}{x}} = \frac{x}{y}$$

$$= \frac{1}{0}$$

undefined

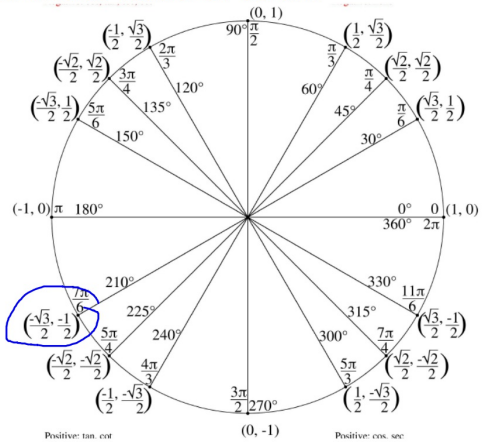


4. $\text{Sec}\left(\frac{-17\pi}{6}\right)$

$$= \text{Sec}\left(\frac{7\pi}{6}\right)$$

$$= \frac{1}{\cos\frac{7\pi}{6}} = \frac{1}{-\frac{\sqrt{3}}{2}}$$

$$= -\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$$

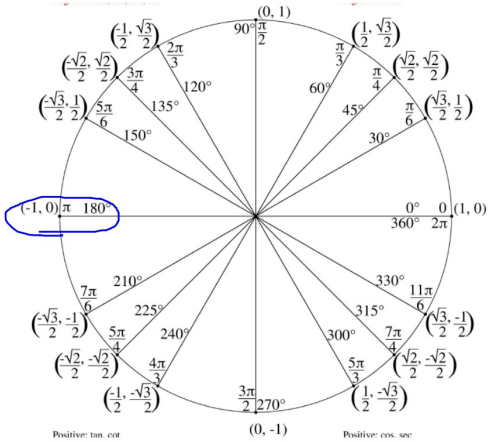


5. $\text{Csc}\,1620°$

$$= \text{Csc}\,180°$$

$$= \frac{1}{\sin 180} = \frac{1}{0}$$

Undefined

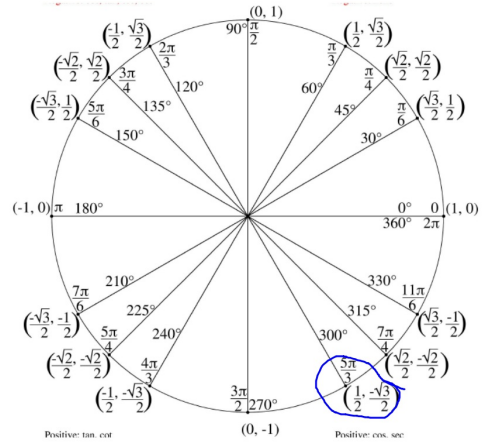


6. $\text{Cot}\,\frac{29\pi}{3}$

$$= \text{Cot}\,\frac{5\pi}{3} \rightarrow \frac{x}{y}$$

$$= \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{-\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$= -\frac{\sqrt{3}}{3}$$



Given that Cotx = $\frac{9}{5}$ this can be turned into Tanx immediately

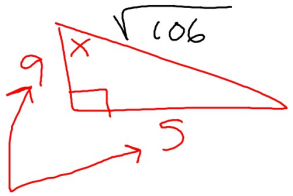
Evaluate the other five trig functions. Rationalize all denominators as needed.

Sinx = $\frac{5}{\sqrt{106}} = \frac{5\sqrt{106}}{106}$ Cosx = $\frac{9}{\sqrt{106}} = \frac{9\sqrt{106}}{106}$

Tanx = $\frac{5}{9}$ Secx = $\frac{\sqrt{106}}{9}$

Cscx = $\frac{\sqrt{106}}{5}$

Use Pythagorean Theorem to find the hypotenuse.



Since Tan is OPP/ADJ
the 5 is the opposite leg and
9 is the adjacent leg.

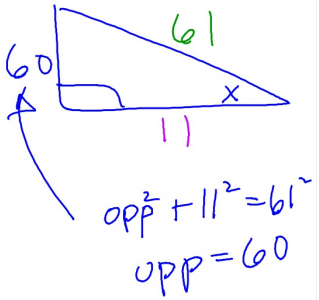
Given that Cosx = $\frac{11}{61}$ $\frac{ADJ}{HYP}$

Evaluate the other five trig functions.

Sinx = $\frac{60}{61}$ Tanx = $\frac{60}{11}$

Cscx = $\frac{61}{60}$ Secx = $\frac{61}{11}$

Cotx = $\frac{11}{60}$



You can now finish Hwk #31 Sec 13-8

Page 766 Problems 2-4, 9-14
AND
Page 797 Problems 25, 28, 30

Due Tomorrow

Sec 14-1: Trigonometric Identities

An Identity is an equation where both sides are ALWAYS equal.

Example: $x + 2 + 7 + 2x = 3(x + 3)$

if you simplify both sides you get the following:

$3x + 9 = 3x + 9$

Tools available to you:

$\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\quad \cot\theta = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta}$

$\csc\theta = \frac{1}{\sin\theta}$ $\quad \sec\theta = \frac{1}{\cos\theta}$

You will be doing two things in this section.

- Simplifying trig expressions.
- Verifying a trig identity.

Simplify each trig expression.

1. $\frac{\cos\theta \cdot \csc\theta}{\cot\theta}$

One technique that is used is to change everything into Sin and Cos then simplify.

$$\frac{\cos \cdot \frac{1}{\sin}}{\frac{\cos}{\sin}} = \frac{\frac{\cos}{\sin}}{\frac{\cos}{\sin}} = 1$$

2. $\sec\theta \cdot \sin\theta \cdot \cot\theta$

$$\frac{1}{\cos\theta} \cdot \sin\theta \cdot \frac{\cos\theta}{\sin\theta} = 1$$