

Thursday, November 29, 2018
7:26 PM

/Precalc **KEY** 4.4B: Trig functions of any angle

Obj: To evaluate the trig functions of any angle

Hwk: 4.4B problems - draw reference Δ for each!!!

4.1 - 4.4 Test

Radian Project due

Do Now:

1 Find the 6 trig functions for $t = \frac{4\pi}{3}$ using a reference triangle.

Y/C $\sin \theta = \frac{-\sqrt{3}}{2}$

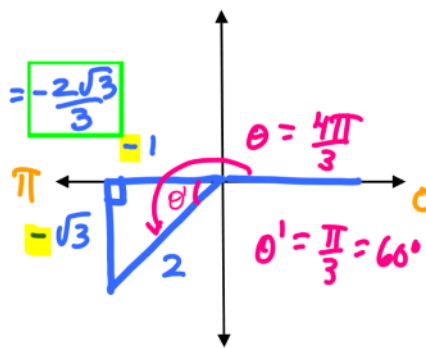
$\csc \theta = \frac{1}{\sin \theta} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2\sqrt{3}}{3}$

X/C $\cos \theta = \frac{-1}{2}$

$\sec \theta = \frac{1}{\cos \theta} = \frac{1}{-\frac{1}{2}} = -2$

X/Y $\tan \theta = \frac{-\sqrt{3}}{-1} = \sqrt{3}$

$\cot \theta = \frac{1}{\tan \theta} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

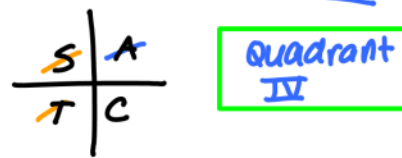


2 State the quadrant in which θ lies:

a. $\tan \theta < 0$ and $\csc \theta > 0$

b. $\sec \theta > 0$ and $\sin \theta < 0$

Sin
Cos
Tan



Recap:

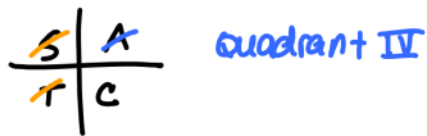
- What's the difference between section 4.2 & 4.4?
i.e. Working in a UNIT CIRCLE vs. without it?

RADIUS IS NO LONGER 1 so:

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

*Radius (hyp.) and reference angles are always positive!

Example 1:



If $\cos \theta = \frac{8}{17}$ and $\tan \theta < 0$, find the other 5 trig functions

7/15 $\sin \theta = \frac{-15}{17}$

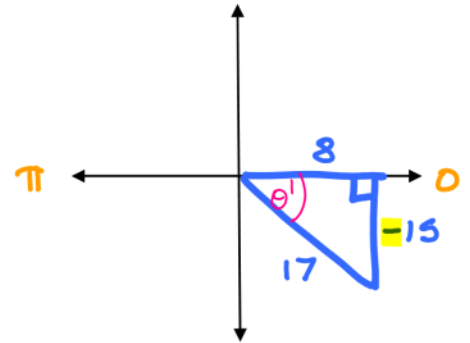
$\csc \theta = \frac{-17}{15}$

7/15 $\cos \theta = \frac{8}{17}$

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

7/15 $\tan \theta = \frac{-15}{8}$

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



Example 2:

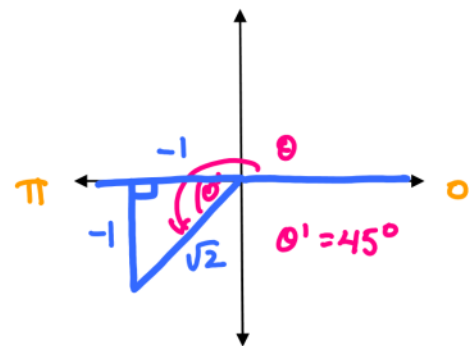


Find the exact value for the 6 trig functions given $\theta = \frac{5\pi}{4}$

7/15 $\sin \theta = -\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$ $\csc \theta = -\sqrt{2}$

7/15 $\cos \theta = -\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$ $\sec \theta = -\sqrt{2}$

7/15 $\tan \theta = \frac{-1}{-1} = 1$ $\cot \theta = 1$



What is the reference angle for θ ? Find the point (x,y) on the unit circle that corresponds to the angle θ .

$\theta' = \frac{\pi}{4} = 45^\circ$

Example 3:

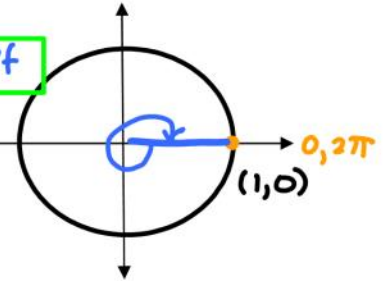
Evaluate the trig functions given that.....

a) $\theta = -2\pi$

y $\sin \theta = 0$ $\csc \theta = \frac{1}{0} = \text{undef}$

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

$\frac{y}{x}$ $\tan \theta = \frac{0}{1} = 0$ $\cot \theta = \frac{1}{0} = \text{undef}$

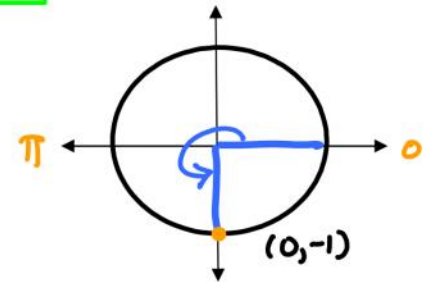


b) $\theta = \frac{3\pi}{2}$

y $\sin \theta = -1$

x $\cos \theta = 0$

$\frac{y}{x}$ $\tan \theta = \frac{-1}{0} = \text{undef}$

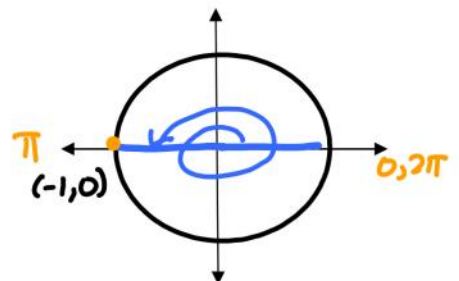


c) $\theta = 3\pi$

y $\sin \theta = 0$

x $\cos \theta = -1$

$\frac{y}{x}$ $\tan \theta = \frac{0}{-1} = 0$



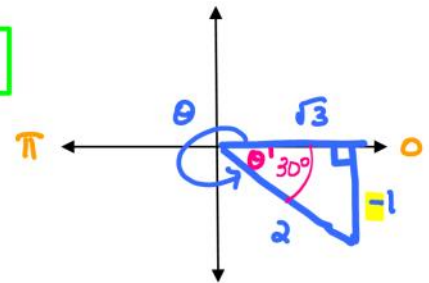
Example 4:

Evaluate the sine, cosine, and tangent without using a calculator for the given values of θ .

a) $\frac{11\pi}{6}$

$\sin \theta = \boxed{-\frac{1}{2}}$ $\cos \theta = \boxed{\frac{\sqrt{3}}{2}}$

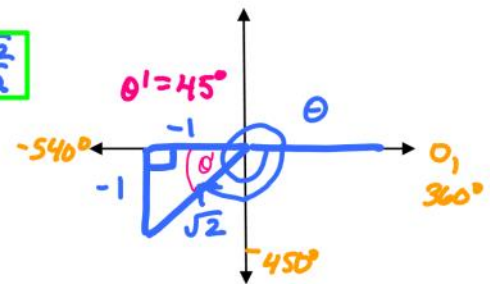
$\tan \theta = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \boxed{-\frac{\sqrt{3}}{3}}$



b) -495°

$\sin \theta = \boxed{-\frac{\sqrt{2}}{2}}$ $\cos \theta = \boxed{\frac{\sqrt{2}}{2}}$

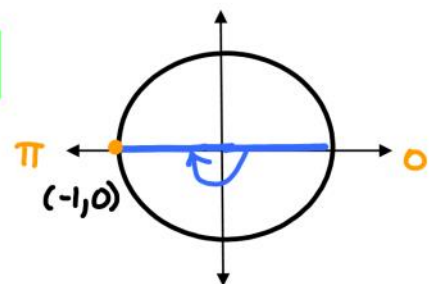
$\tan \theta = \frac{-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \boxed{-1}$



c) $-\pi$

$\sin \theta = \boxed{0}$ $\cos \theta = \boxed{-1}$

$\tan \theta = \frac{0}{-1} = \boxed{0}$



Example 5: $y \sin \csc \frac{1}{y}$ when is $y = 0$?

Given that $\csc \theta$ is undefined and $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{2}$, find the other trig functions

$$y \sin \theta = \boxed{0}$$

$$\csc \theta = \frac{1}{0} = \boxed{\text{undef}}$$

$$x \cos \theta = \boxed{-1}$$

$$\sec \theta = \frac{1}{-1} = \boxed{-1}$$

$$\frac{y}{x} \tan \theta = \frac{0}{-1} = \boxed{0}$$

$$\cot \theta = \frac{-1}{0} = \boxed{\text{undef.}}$$

