PreCalculus
Section 4.4a
Objective: evaluate trig function of any angle

Sep 15-3:36 PM

WARM UP

Draw the angle θ in standard position whose terminal ray goes through the point (-3,4). (Remember, an angle in standard position has its initial ray on the positive x-axis.)

Now draw the "**reference triangle**" by drawing the line that connects (-3,4) to the x-axis. Label all 3 lengths of the triangle and find the six trig functions of θ. Watch your signs!

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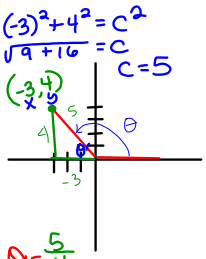
$(-3)^2+4^2=c^2$

$\sqrt{9+16}=c$

$c=5$



$\sin\theta=\frac{4}{5}$ $\quad \csc\theta=\frac{5}{4}$

$\cos\theta=\frac{-3}{5}$ $\quad \sec\theta=\frac{5}{-3}$

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

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Definition of Trigonometric Function of Any Angle

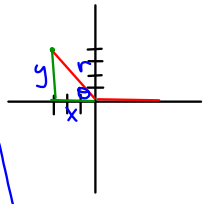
Let θ be an angle in standard position with (x,y) a point on the terminal side of θ and $r=\sqrt{x^2+y^2}\neq 0$.

$\sqrt{r^2}=\sqrt{x^2+y^2}$

$\sin\theta=\frac{y}{r}$ $\quad \csc\theta=\frac{r}{y}$

$\cos\theta=\frac{x}{r}$ $\quad \sec\theta=\frac{r}{x}$

$\tan\theta=\frac{y}{x}$ $\quad \cot\theta=\frac{x}{y}$



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Example | p. 294, #3(a)

Find the six trig functions of the angle determined by the given point.

(x,y)=(-√3, -1)

x y

$r=\sqrt{x^2+y^2}$

$=\sqrt{(-\sqrt{3})^2+(-1)^2}$

$=\sqrt{3+1}$

$=\sqrt{4}$

$=2$

$\sin\theta=\frac{-1}{2}$

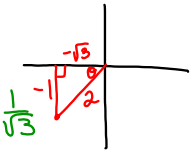
$\cos\theta=\frac{-\sqrt{3}}{2}$

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

$\csc\theta=-2$

$\sec\theta=\frac{-2}{\sqrt{3}}$

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



p. 294, #1 (HW)

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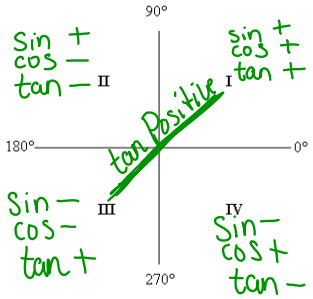
Knowing the signs of trig functions is important!



Remember: r is always positive!

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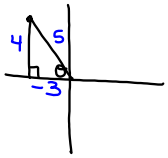
Example

Given $\sin\theta=4/5$ and $\tan\theta<0$, find $\cos\theta$ and $\cot\theta$.

+ − −



$\cos\theta=\frac{-3}{5}$

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

p. 295, #19 (HW)

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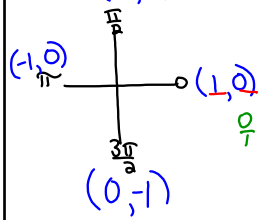
Quadrant Angles

Evaluate the cosecant and cotangent functions at the angles 0, $\pi/2$, π, and $3\pi/2$.

(0,1)



$\csc 0=\frac{1}{0}$ undef.

$\csc\frac{\pi}{2}=1$

$\csc\pi=$ undef.

$\csc\frac{3\pi}{2}=-1$

$\cot 0=$ undef.

$\cot\frac{\pi}{2}=0$

$\cot\pi=$ undef.

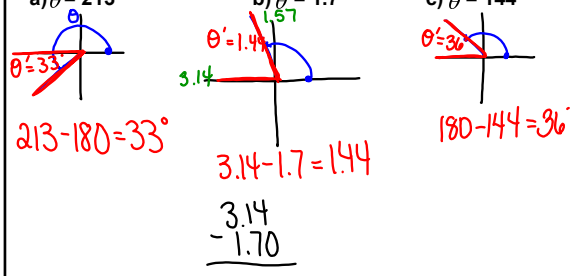
$\cot\frac{3\pi}{2}=0$

p. 295, #29 (HW)

Sep 15-4:02 PM

Reference Angles: Let θ be an angle in standard position. Its reference angle is the acute angle θ' formed by the terminal side of θ and the horizontal axis (x-axis).

a) $\theta = 213^\circ$ b) $\theta = 1.7$ c) $\theta = 144^\circ$



213-180=33°

3.14-1.7=1.44

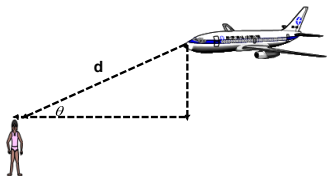
3.14
-1.70

180-144=36°

Aug 31-4:57 PM

An airplane flying at an altitude of 6 miles is on a flight path that passes directly over an observer. If θ is the angle of elevation from the observer to the plane when

a) $\theta = 30^\circ$ b) $\theta = 120^\circ$



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Conclusion

1. How do we find the radius given a point on the circle?

$r = \sqrt{x^2 + y^2}$

2. What quadrant has a negative sine, positive cosine? IV What is the tangent? Negative

3. How do you find a reference angle?

Terminal side + x-axis

Aug 27-3:39 PM

Either

***Write a question you still have over trig. on a sticky note and place it under ?????

OR

***Write something you absolutely know and could possibly teach. Place it under the !!!!!

Aug 27-3:41 PM

HOMEWORK

...Tomorrow is a workday for this section.
So, if you're short on time, you may want to focus on the quizzes.

Tomorrow: Circle Quiz #2 (sine, cosine, tangent)

8 quizzes total; we'll keep highest 5 for a combined quiz grade

4.4a: Page 295 1, 5, 9, 13-25 odd, 29-36, 37-51 EOO

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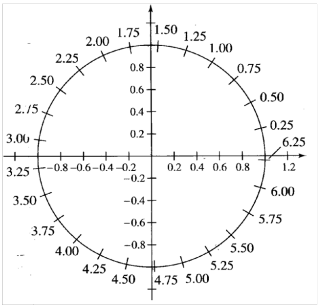
Back to the unit circle, where r=_____...

You can find this circle on p. 275



$\cos\theta = .25$

$\sin\theta = -.6$

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