

KEY to Trig Practice Quiz #1

To evaluate trig functions at any given angle θ :

- Name the reference angle (angle measuring less than 90 or $\pi/2$) corresponding to θ .
- Identify the quadrant of its terminal side
- Refer to the basic trig angles for ratios
- Avoid using the value expressed with a rationalized denominator
- Give the ratio the correct sign, according to the quadrant it's in (ASTC)
- Write reciprocal functions in terms of their corresponding function before doing the steps above

1. After each item the quadrant of the terminal angle is given:

$$\sin\left(\frac{3\pi}{4}\right) = \sin\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}} \quad \text{QII} \qquad \cos\left(\frac{5\pi}{6}\right) = -\cos\left(\frac{\pi}{6}\right) = -\frac{\sqrt{3}}{2} \quad \text{QII}$$

$$\tan\left(\frac{5\pi}{3}\right) = -\tan\left(\frac{\pi}{3}\right) = -\sqrt{3} \quad \text{QIV} \qquad \csc\left(\frac{\pi}{4}\right) = \frac{1}{\sin(\pi/4)} = \frac{1}{1/\sqrt{2}} = \sqrt{2} \quad \text{QI}$$

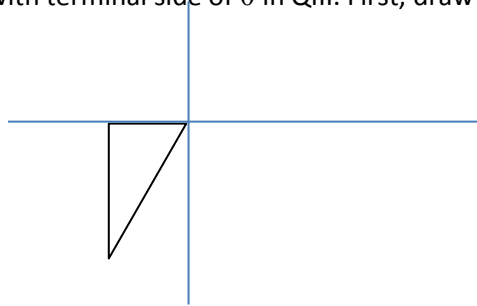
$$\cos(13\pi) = \cos \pi = -1 \quad \text{QII}$$

$$\sec\left(\frac{13\pi}{4}\right) = \frac{1}{\cos(13\pi/4)} = \frac{1}{-\cos(\pi/4)} = \frac{1}{-1/\sqrt{2}} = -\sqrt{2} \quad \text{QIII}$$

$$\cot\left(\frac{17\pi}{6}\right) = \frac{1}{\tan(17\pi/6)} = \frac{1}{-\tan(\pi/6)} = \frac{1}{-1/\sqrt{3}} = -\sqrt{3} \quad \text{QII}$$

$$\sin\left(\frac{7\pi}{2}\right) = -\sin\left(\frac{\pi}{2}\right) = -1 \quad \text{between QIII and IV}$$

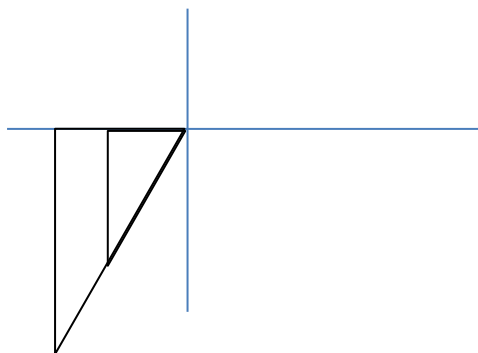
2. Given $\cos \theta = -2/3$ with terminal side of θ in QIII. First, draw this:



Notice this question has nothing to do with the measure of the angle. It's the ratio that gives us all the info we need.

Label the point on the terminal side $(-2, y)$. Since $\cos \theta = -2/3$, the radius is 3. So the other leg is found by the Pythagorean theorem to be $y = \sqrt{3^2 - (-2)^2} = \sqrt{5}$. The point is thus $(-2, \sqrt{5})$. Label that point on the drawing.

The y-coordinate goes to $-2\sqrt{5}$ when the x-coordinate is -4 , since it is increased by a factor of 2. So that point is $(-4, -2\sqrt{5})$. The radius will be 6. The triangles are similar, so the calculation is a simple proportion. Label it, too.



The unit circle has a radius of 1, so the triangle is scaled back to its similar triangle. Divide the first set of coordinates by 3 (the radius) or the second by 6. Either way, you will get the point on the unit circle of $\left(-\frac{2}{3}, -\frac{\sqrt{5}}{3}\right)$. Draw on the diagram above, showing the unit circle radius of 1 and its corresponding point.

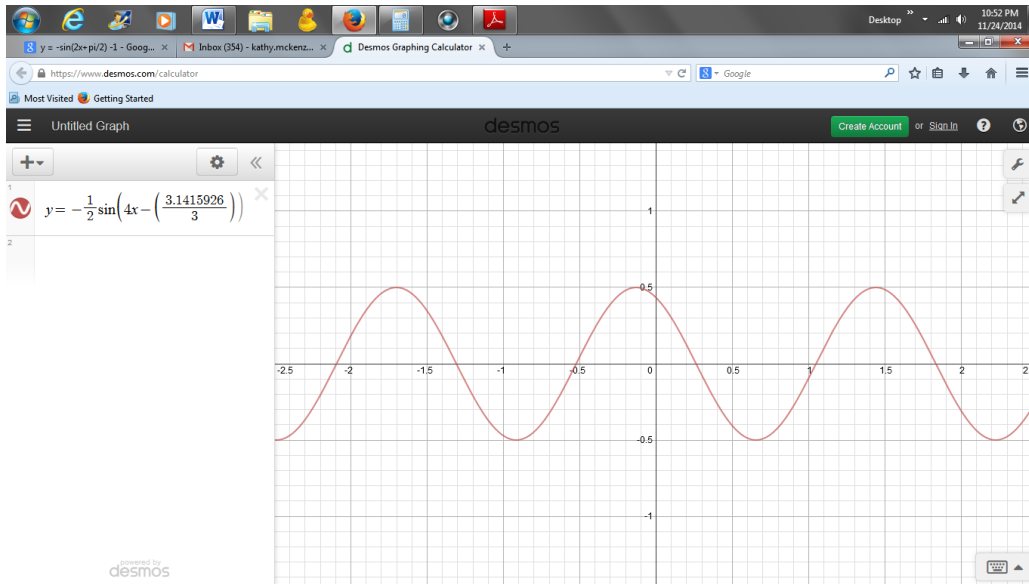
3. The angle measure is 330° , but the arc length formula $s = \theta r$ requires degrees be given in radian measure.

Converting: $330^\circ \times \pi/180^\circ = 11\pi/6$.

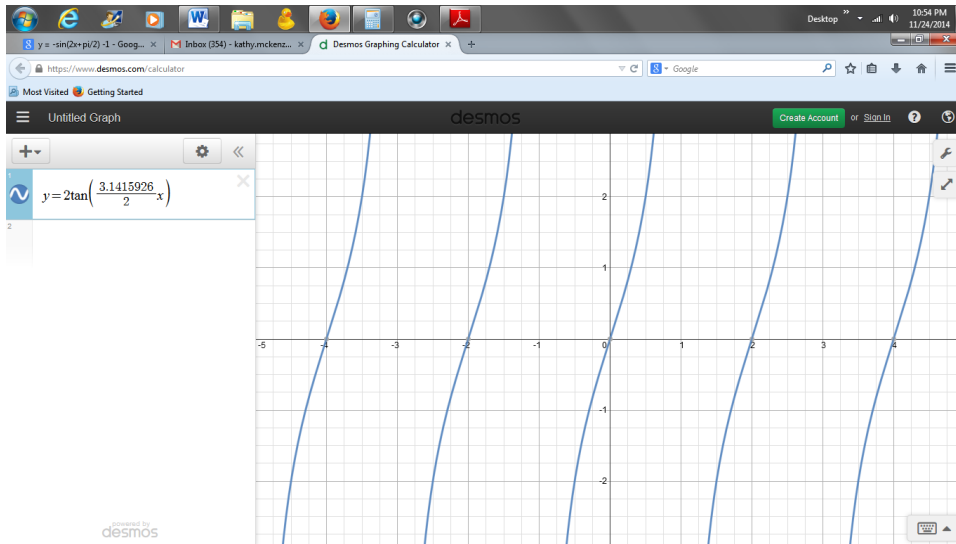
$s = (11\pi/6)(6 \text{ in.}) = 11\pi/6 \text{ in.}$

4. a)
$$f(x) = -\frac{1}{2} \sin\left(4x - \frac{\pi}{3}\right) = -\frac{1}{2} \sin\left(4\left(x - \frac{\pi}{12}\right)\right)$$

amp = $-1/2$, $B = 4$, so period = $2\pi/4 = \pi/2$, horizontal shift = $\frac{\pi}{12}$ right,



b) $g(x) = 2 \tan\left(\frac{\pi}{2}x\right)$ amp = 2, $B = \frac{\pi}{2}$, so period = $\frac{\pi}{\pi/2} = 2$, no horizontal shift



2 types of questions that were not on the practice quiz but which will be on the quiz.

5. Suppose $\theta = \pi/7$.

a) What is the complement of θ ? Answer: $\pi/2 - \pi/7 = 5\pi/14$

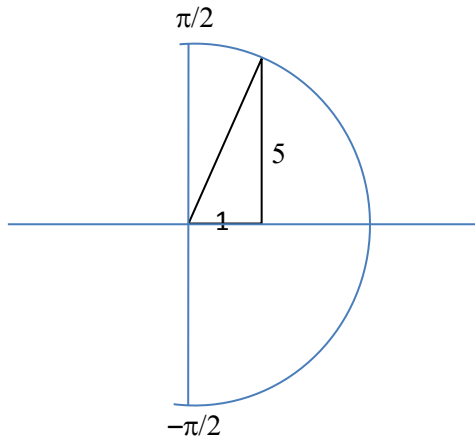
b) What is the supplement of θ ? Answer: $\pi - \pi/7 = 6\pi/7$

c) Name 2 angles coterminal with θ , one negative and one positive.

Answers: $\pi/7 + 2\pi = 15\pi/7$ and $\pi/7 - 2\pi = -13\pi/7$

6. Given $\tan \theta = 5$, with $-\pi/2 < \theta < \pi/2$, find the measures of the other 5 trig functions for this angle.

Answer: The domain the right half of the circle. Since $\tan \theta = 5/1 = \text{opp/adj}$, $r^2 = 1^2 + 5^2$, hence, $r = \sqrt{26}$



The other trig fcn values are:

$$\sin \theta = 5/\sqrt{26}, \quad \cos \theta = 1/\sqrt{26}, \quad \csc \theta = \sqrt{26}/5, \quad \sec \theta = 5/\sqrt{26}, \quad \cot \theta = 1/5$$