Radian Trig

No Calculators this Unit!

No Calc Quiz Thursday - Must be ready

No partial credit, all or nothing

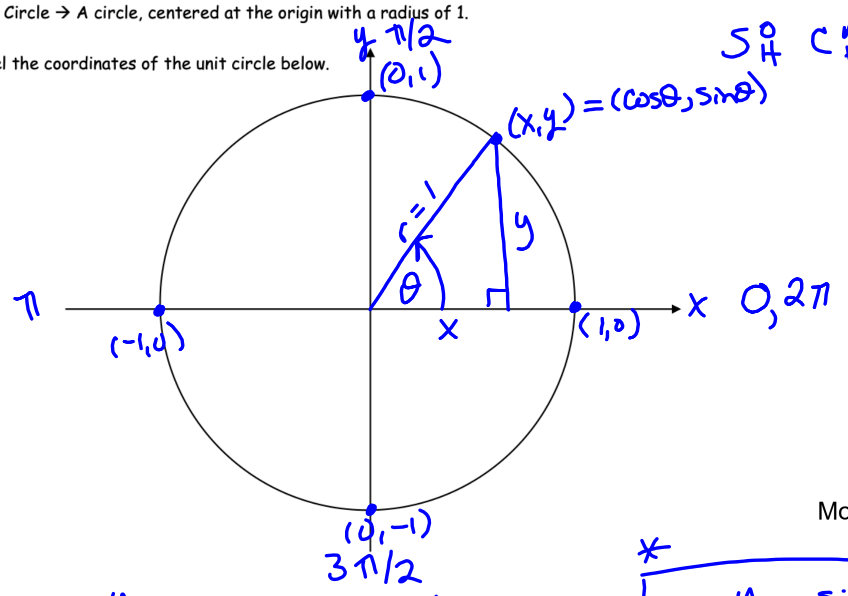
GHW #10 due Friday

Dec 29-8:47 PM

Unit Circle → A circle, centered at the origin with a radius of 1.

Label the coordinates of the unit circle below.

$S\frac{O}{H}\ C\frac{A}{H}\ T\frac{O}{A}$



More below...

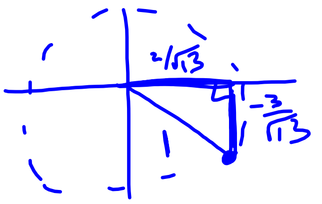
$\sin\theta = \frac{y}{1} = y$ $\cos\theta = \frac{x}{1} = x$ * $\boxed{\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}}$

Find each of the following trig values using your unit circle:

1. $\sin\pi = 0$ $(-1,0)$
2. $\cos(\pi/2) = 0$ $(0,1)$
3. $\tan\pi = \frac{\sin\pi}{\cos\pi} = \frac{0}{-1} = 0$ $(-1,0)$
4. $\sin(3\pi/2) = -1$ $(0,-1)$
5. $\cos\pi = -1$ $(-1,0)$
6. $\tan(-3\pi) = \frac{\sin -3\pi}{\cos -3\pi} = \frac{0}{-1} = 0$ $(-1,0)$

Dec 29-9:01 PM

7. a. Verify $\left(\frac{2}{\sqrt{13}}, -\frac{3}{\sqrt{13}}\right)$ is a point on the unit circle. → (+, −) → Q IV



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

$\left(\frac{2}{\sqrt{13}}\right)^2+\left(\frac{-3}{\sqrt{13}}\right)^2 \stackrel{?}{=} 1^2$

$\frac{4}{13}+\frac{9}{13} \stackrel{?}{=} 1$

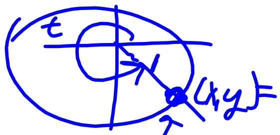
$\frac{13}{13} \stackrel{?}{=} 1$

$1 = 1$ ✓

yes, the point is on the unit circle.

b. Assume that the terminal side of angle t radians passes through the point $\left(\frac{2}{\sqrt{13}}, -\frac{3}{\sqrt{13}}\right)$ on the unit circle. Find sin t, cos t, and tan t in simplest radical form.

(+, −)



y

sin t = $\frac{-3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}$

x

cos t = $\frac{2}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$

tan t = $\frac{\sin t}{\cos t} = \frac{-3/\sqrt{13}}{\frac{2}{\sqrt{13}}} = \frac{-3}{\cancel{\sqrt{13}}} \cdot \frac{\cancel{\sqrt{13}}}{2} = -\frac{3}{2}$

Dec 29-9:03 PM

What if the circle has a radius ≠ 1? Let's call it "r"

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

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

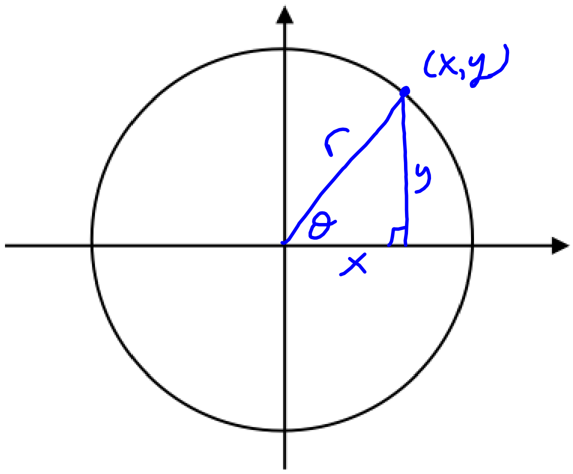
$\sin\theta = \frac{y}{r}$

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

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

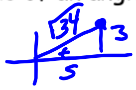
$\left(\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{y}{r} \cdot \frac{r}{x} = \frac{y}{x}\right)$

FYI



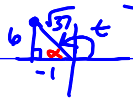
Dec 29-9:04 PM

Find sin t, cos t, and tan t in simplest radical form when the terminal side of an angle of t radians in standard position passes through the given point.



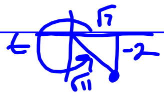
8. (5, 3) QI r = $\sqrt{x^2+y^2} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$

sin t = $\frac{3}{\sqrt{34}} \cdot \frac{\sqrt{34}}{\sqrt{34}} = \frac{3\sqrt{34}}{34}$ cos t = $\frac{5}{\sqrt{34}} \cdot \frac{\sqrt{34}}{\sqrt{34}} = \frac{5\sqrt{34}}{34}$ tan t = $\frac{3}{5}$



9. (-1, 6) QII r = $\sqrt{(-1)^2+6^2} = \sqrt{1+36} = \sqrt{37}$

sin t = $\frac{6}{\sqrt{37}} = \frac{6\sqrt{37}}{37}$ cos t = $\frac{-1}{\sqrt{37}} = \frac{-1\sqrt{37}}{37}$ tan t = $\frac{6}{-1} = -6$



10. $(+,-)$ QIV $(\sqrt{7}, -2)$ r = $\sqrt{(\sqrt{7})^2+(-2)^2} = \sqrt{7+4} = \sqrt{11}$

sin t = $\frac{-2}{\sqrt{11}} = \frac{-2\sqrt{11}}{11}$ cos t = $\frac{\sqrt{7}}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}} = \frac{\sqrt{77}}{11}$ tan t = $\frac{-2}{\sqrt{7}} = \frac{-2\sqrt{7}}{7}$

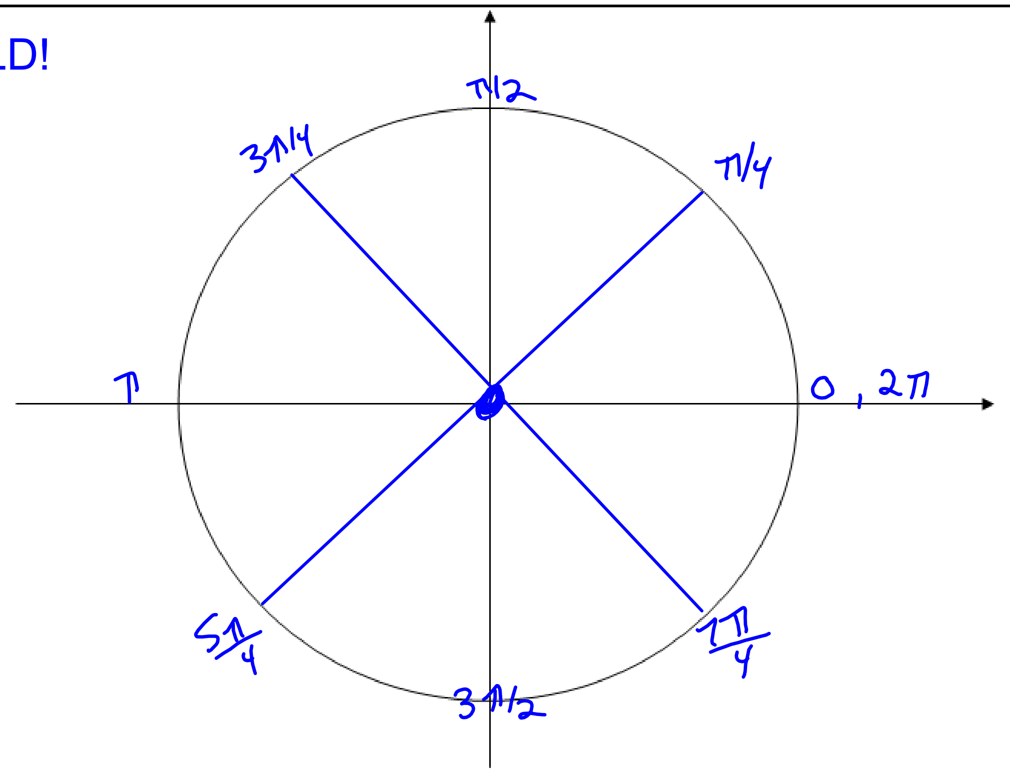
Dec 29-9:05 PM

Model #11 in homework

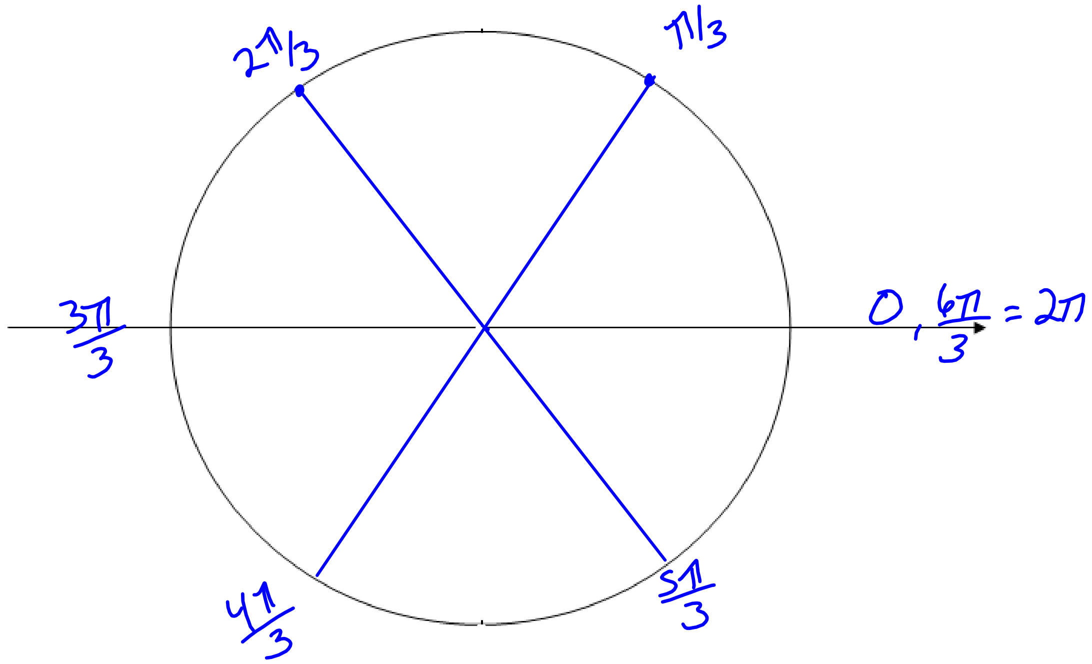
Fold Circles

Jan 1-9:52 PM

FOLD!



Dec 3-8:12 AM



Dec 9-9:03 AM

Jan 5-9:35 PM