40) $\cot \frac{3\pi}{4}$

$$\frac{1}{\tan\left(\frac{3\pi}{4}\right)}$$

Section 4.2 Trigonometric Functions: The Unit Circle

Find the exact values of the six trigonometric functions of θ.

45°

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

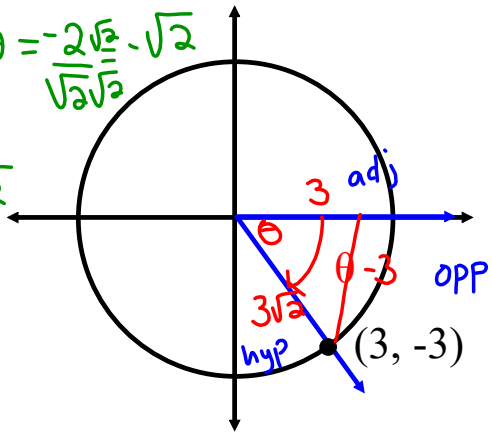
$\csc\theta = \frac{-2\sqrt{2}}{\sqrt{2}\sqrt{2}} \cdot \sqrt{2}$

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

$\sec\theta = \sqrt{2}$

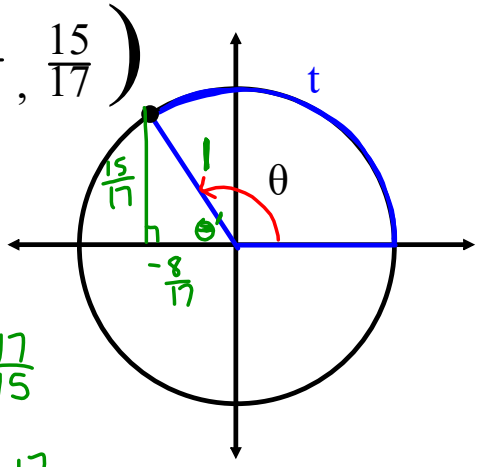
$\tan\theta = \frac{-3}{3} = -1$

$\cot\theta = -1$



Find the exact vales of the six trigonometric functions of the real number *t*.

$\left(-\frac{8}{17}, \frac{15}{17}\right)$



$\sqrt{\left(\frac{15}{17}\right)^2 + \left(\frac{-8}{17}\right)^2} = h$

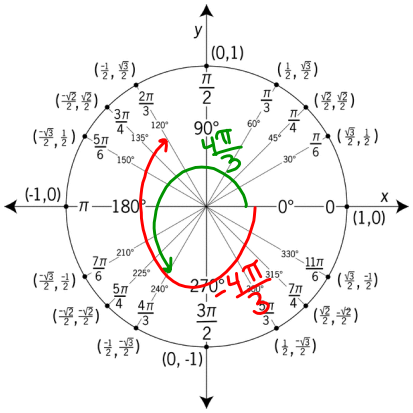
$h = 1$

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

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

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

Find the point (x, y) on the unit circle that corresponds to the real number *t*.



$t = 11\pi/6$ $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

$t = -4\pi/3$ $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

Evaluate (if possible) the sine, cosine, and tangent at the real number.

$t = 5\pi/3$ $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

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

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

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

$t = -\pi$ $(-1, 0)$

$\sin\theta = 0$

$\cos\theta = -1$

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

Evaluate (if possible) the six trigonometric functions at the real number.

$t = 7\pi/4$

$t = -3\pi/2$ (0,1)

$\sin\theta = 1$

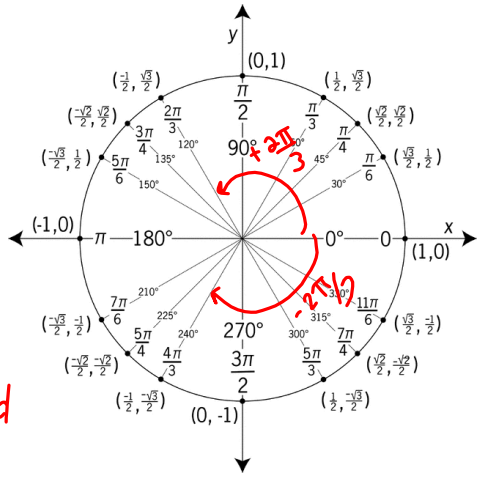
$\cos\theta = 0$ adj/hyp

$\tan\theta = \frac{1}{0}$ undefined

$\csc\theta = 1$

$\sec\theta$ = undefined hyp/adj $\frac{1}{0}$

$\cot\theta = 0$



Evaluate the trigonometric function using its period as an aid.

$\cos(3\pi)$ (-1,0)

$\cos(3\pi) = -1$

$\sin(9\pi/4)$

$\sin(\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(-8\pi/3)$

$\sin(-2\pi/3) = -\frac{\sqrt{3}}{2}$

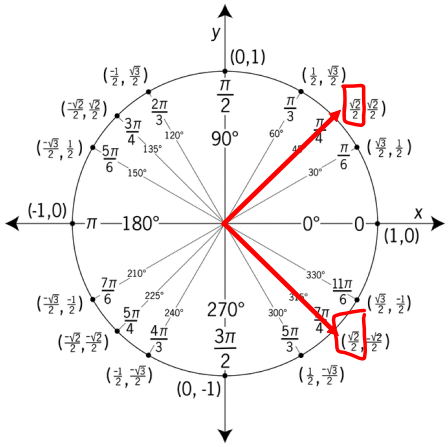
Even and Odd Trigonometric Functions

The cosine and secant functions are **even**.

$\cos(-t) = \cos t$ $\sec(-t) = \sec t$

$\cos(-\frac{\pi}{4}) = \frac{\sqrt{2}}{2}$

$\cos(\frac{\pi}{4}) = \frac{\sqrt{2}}{2}$



What does this mean?

check values of cosine where $t = \pi/4$ and $t = -\pi/4$

Use the given value to evaluate each function: $\cos t = -3/4$

a) $\cos(-t) = -\frac{3}{4}$

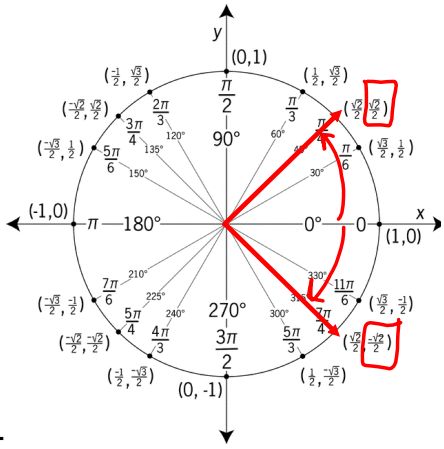
b) $\sec(-t) = -\frac{4}{3}$

Even and Odd Trigonometric Functions

The sine, cosecant, tangent, and cotangent functions are **odd**.

$\sin(-t) = -\sin t$ $\csc(-t) = -\csc t$

$\tan(-t) = -\tan t$ $\cot(-t) = -\cot t$



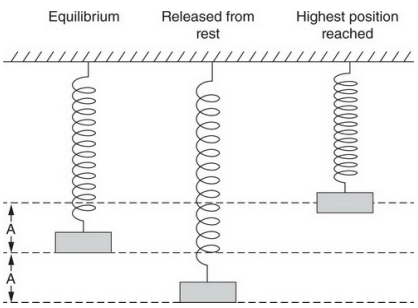
What does this mean?
check values of sine where $t = \pi/4$ and $t = -\pi/4$

Use the given value to evaluate each function: $\sin(-t) = 3/8$

a) $\sin t = \frac{-3}{8}$

b) $\csc t = \frac{-8}{3}$

The displacement from equilibrium of an oscillating weight suspended by a spring is given by $y(t) = \frac{1}{4}\cos 6t$, where y is the displacement (in feet) and t is the time (in seconds). Find the displacements when a) $t = 0$, b) $t = \frac{1}{4}$, and c) $t = \frac{1}{2}$.



a) $y = \frac{1}{4}\cos(6 \cdot 0) = .25$ ft

b) $y = \frac{1}{4}\cos\left(6 \cdot \frac{1}{4}\right) = .017$ ft

c) $y = \frac{1}{4}\cos\left(6 \cdot \frac{1}{2}\right) = -.248$ ft

The displacement from equilibrium of an oscillating weight suspended by a spring and subject to the damping effect of friction is given by $y(t) = \frac{1}{4}e^{-t}\cos 6t$, where y is the displacement (in feet) and t is the time (in seconds).

a) Complete the table

t	0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1
y	1/4	.014	-.15	-.03	.09

$y = \frac{1}{4}e^{0}\cos(6\cdot 0)$

$y = 1/4\, e^{-1/4}\cos(6\cdot 1/4)$

b) Use the table feature of a graphing utility to approximate the time when the weight reaches equilibrium.

c) What appears to happen to the displacement as t increases?

Section 4.2 Pgs. 275-276: #5-12, 13-41 odd, 43-50