Chapter 4.1 HW Qz look over formulas

Convert to other measure(radians or degrees):

a. $-40°$ b. $\frac{2\pi}{3}$

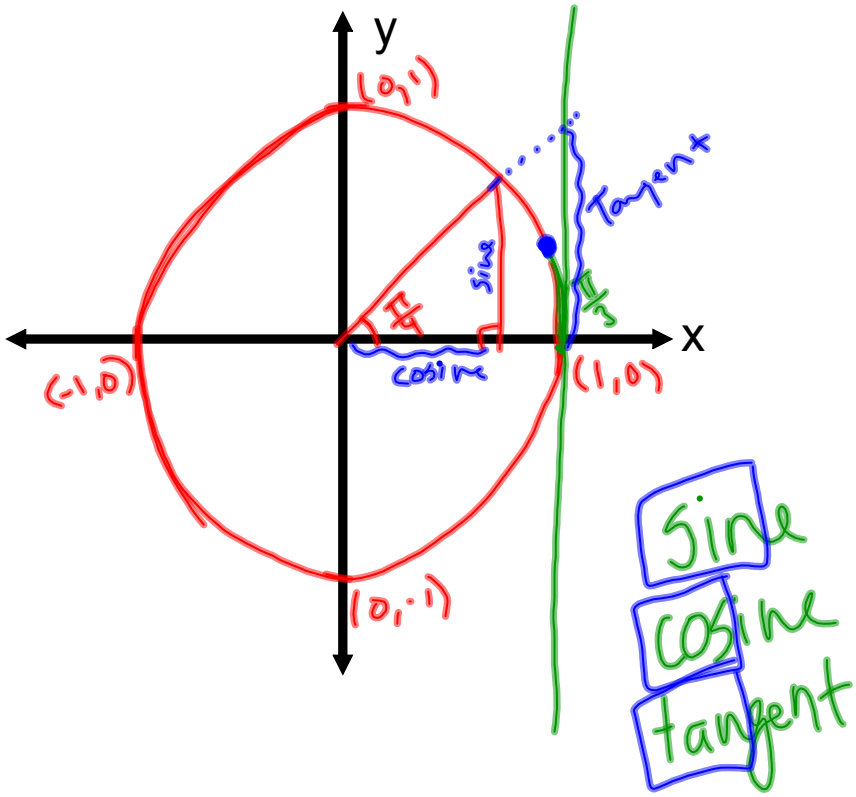
A water wheel has a radius of 12 ft. The wheel is rotating at 20 revolutions per minute. Find the linear speed, in feet per minute of the water.

Chapter 4.2: Trig Functions: The Unit Circle

Trigonometry means measurement of triangles

A unit Circle is a circle of radius 1 centered at the origin. $x^2 + y^2 = 1$

in a unit circle the angle measure is equal to the measure of the arc.



There are 6 trig functions. The inputs are real numbers, t. Their outputs involve a point on the unit circle.

t is the angle in radians and P(x,y) is a point

$\sin(t) = y \qquad \cos(t) = x \qquad \tan(t) = \frac{y}{x}, x \neq 0$

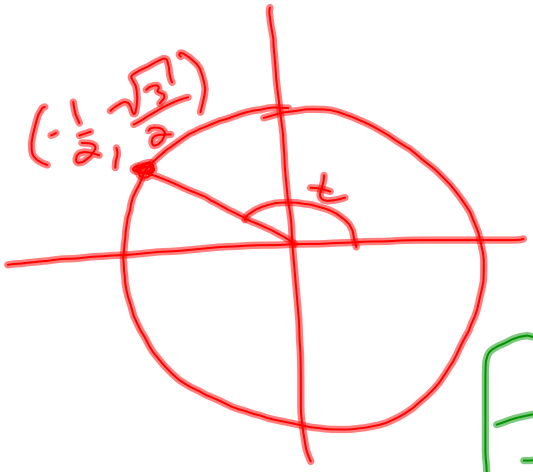
$\csc(t) = \frac{1}{y} \qquad \sec(t) = \frac{1}{x} \qquad \cot(t) = \frac{x}{y}, y \neq 0$

Cosecant
$\frac{1}{\sin}$

Secant
$\frac{1}{\cos}$

Cotangent
$\frac{1}{\tan}$

if t is the angle for point $\left(-\frac{1}{2},\frac{\sqrt{3}}{2}\right)$. find the 6 trig functions at t.



$\sin t = \frac{\sqrt{3}}{2}$ $\csc t = \frac{2\sqrt{3}}{3}$

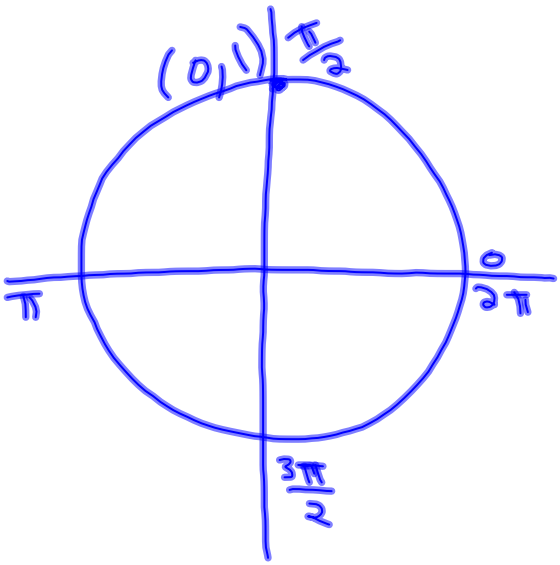
$\cos t = -\frac{1}{2}$ $\sec t = -2$

$\tan t = -\sqrt{3}$ $\cot t = -\frac{\sqrt{3}}{3}$

$\begin{bmatrix} 1 \\ 1 \\ -\frac{1}{2} \end{bmatrix}$ $\frac{2}{1}$ $\begin{bmatrix} -\frac{1}{2} \\ -\frac{\sqrt{3}}{2} \end{bmatrix}$

$-\frac{2}{2\sqrt{3}} = -\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

Find the values of the trig functions at $\frac{\pi}{2}$



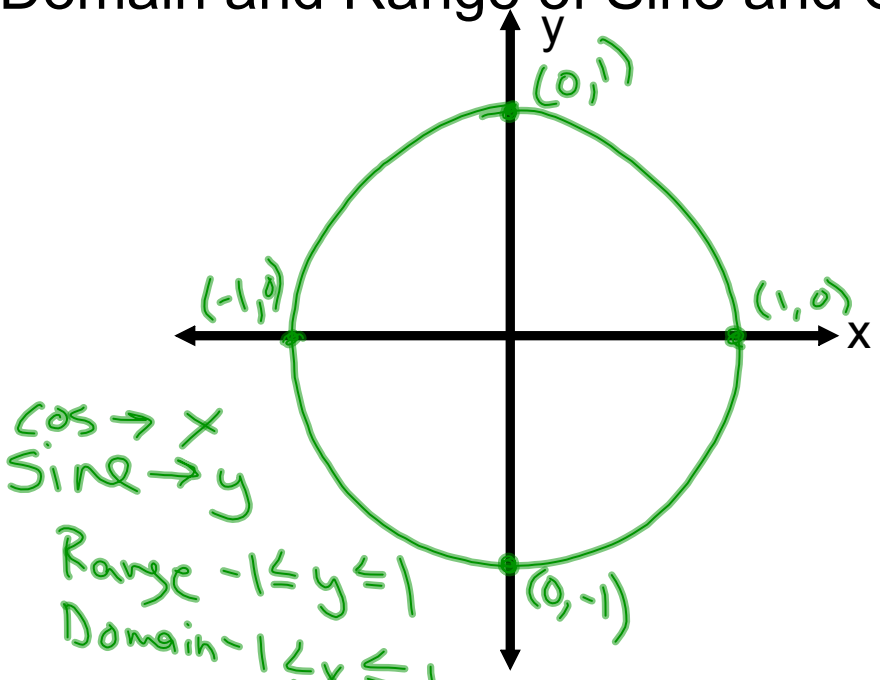
$\sin\frac{\pi}{2} = 1$ $\csc\frac{\pi}{2} = 1$

$\cos\frac{\pi}{2} = 0$ $\sec\frac{\pi}{2} = \text{und}$

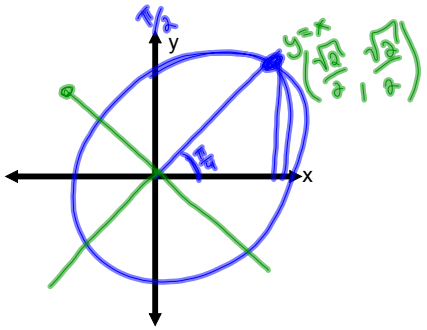
$\tan\frac{\pi}{2} = \text{und.}$ $\cot\frac{\pi}{2} = 0$

$\frac{y}{x}$ $\frac{x}{y}$

Domain and Range of Sine and Cosine



Find Sine, Cosine, Tangent of $\frac{\pi}{4}$



$\sin\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

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

$\tan\frac{\pi}{4} = 1$

$x^2 + y^2 = 1$

$y = x$

$x^2 + x^2 = 1$

$\frac{2x^2}{2} = \frac{1}{2}$

$\sqrt{x^2} = \pm\sqrt{\frac{1}{2}}$

$x = \frac{1}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$

$x = \frac{\sqrt{2}}{2}$

Even and Odd Functions:

Cosine and Secant are even. $\cos(-t) = \cos(t)$

Sine, Cosecant, Tangent and cotangent are odd. $\tan(-t) = -\tan(t)$

$f(-x) = f(x) \rightarrow$ even

$f(-x) = -f(x) \rightarrow$ odd

Find the value of the trig functions:

$\cos\left(-\frac{\pi}{4}\right)$

$\cos\left(\frac{\pi}{4}\right)$

$\frac{\sqrt{2}}{2}$

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

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

-1

Many relationships exist among the trig ratios. These are called Trigonometric Identities.

$$\cos t = \frac{1}{\sec t} \qquad \sin t = \frac{1}{\csc t} \qquad \tan t = \frac{1}{\cot t}$$

$$\tan t = \frac{\sin t}{\cos t} \qquad \cot t = \frac{\cos t}{\sin t}$$

Given the following, find the values of the other trig ratios.

$$\sin t = \frac{1}{2} \quad \cos t = \frac{\sqrt{3}}{2}$$

$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

$\sin t = \frac{1}{2}$

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

$\tan t = \frac{\sqrt{3}}{3}$

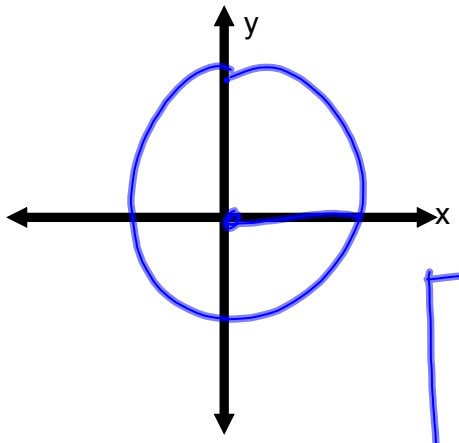
$\csc t = 2$

$\sec t = \frac{2\sqrt{3}}{3}$

$\cot t = \sqrt{3}$

$\frac{y}{x}\left[\begin{matrix}\frac{1}{2} \\ \frac{\sqrt{3}}{2}\end{matrix}\right]$

$\frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$



$x^2 + y^2 = r^2$

$\cos^2\theta + \sin^2\theta = 1^2$

$\cos^2\theta + \sin^2\theta = 1$

$\cos = x$

$\sin = y$

$\cos^2 x + \sin^2 x = 1$

$\cos(x)^2$

Pythagorean Identities:

$\sin^2 t + \cos^2 t = 1$ $1 + \cot^2 t = \csc^2 t$

$1 + \tan^2 t = \sec^2 t$

$\sin t = \frac{3}{5}$

$0 \le t \le \frac{\pi}{2}$

$\cos t = ?$

$\cos^2 t + \sin^2 t = 1$

$\cos^2 t + \left(\frac{3}{5}\right)^2 = 1$

$\cos^2 t + \frac{9}{25} = \frac{25}{25} - \frac{9}{25}$

$-\frac{9}{25}$

$\cos^2 t = \frac{16}{25}$

$\cos t = \frac{4}{5}$

$\frac{\sqrt{14}}{5}$

Periodic Functions:

A function f is periodic if there exists a positive number p such that

$$f(t+p) = f(p)$$

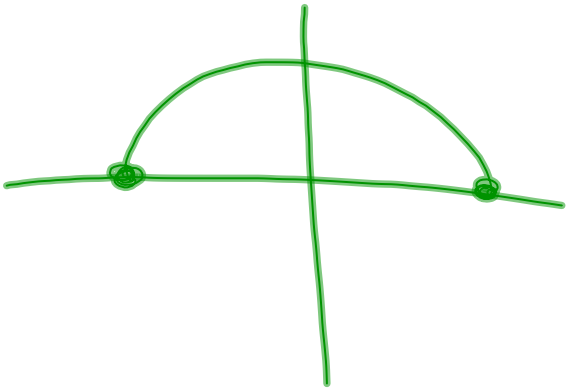
for all t in the domain. The smallest number p for which f is periodic is called the period of f.

example: ocean tides, hours on a clock.

Periodic Properties of Sine, Cosine, Tangent.

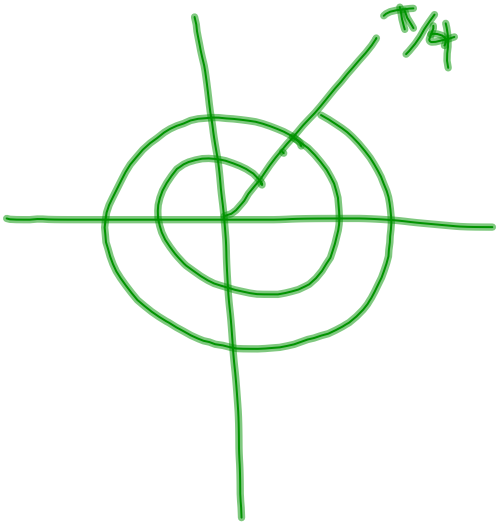
$$\sin(t \pm 2\pi) = \sin t \qquad \cos(t \pm 2\pi) = \cos t$$

$$\tan(t \pm \pi) = \tan t$$



Use the trig values at $t = \frac{\pi}{4}$ to find

$$\sin\left(\frac{9\pi}{4}\right)$$



$\frac{9\pi}{4} - 2\pi - 2\pi$

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

Repetitive Behavior

$$\sin\left(t \pm n2\pi\right) = \sin t \qquad \cos\left(t \pm n2\pi\right) = \cos t$$

$$\tan\left(t \pm n\pi\right) = \tan t$$

where n is some real number

On Calculator:

-Make sure you are in the right mode(rad/deg)

notice where sin,cos,tan are

notice that you do not have sec,scs,cot....

$$\csc t = \frac{1}{\cos t}$$

Use a calculator to find the value to 4 decimal places.

$\cos\frac{\pi}{4}$ $\cot 1.2$

Suggested Problems: Chapter 4.2
pg.450 #'s 3,5-25o,29,33,35,39-53o

#33 No calc.

$\sin(1.7)\csc(1.7) = ?$

$\sin(1.7)\frac{1}{\sin(1.7)} =$

$\frac{\sin(1.7)}{1}$

1