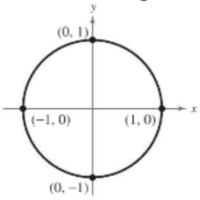
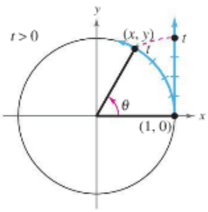
Standard Writing to rough in a section, pre-homework/lecture.

The Unit Circle





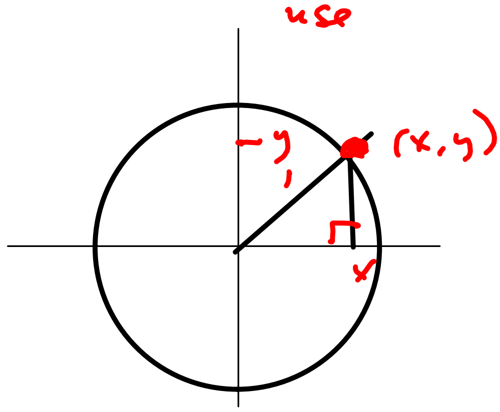
1 = h = hypoten-use

Definitions of Trigonometric Functions

Let t be a real number and let (x, y) be the point on the unit circle corresponding to t.

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

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



Definition of Periodic Function

A function f is **periodic** when there exists a positive real number c such that

$f(t + c) = f(t)$

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

Recall from Section P.6 that a function f is *even* when $f(-t) = f(t)$ and is *odd* when $f(-t) = -f(t)$.

Even and Odd Trigonometric Functions

The cosine and secant functions are *even*.

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

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

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

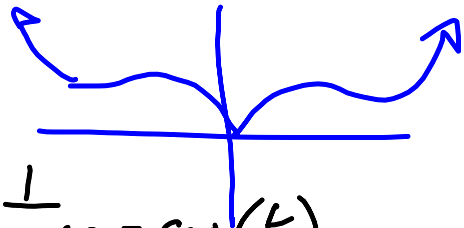
$\tan(-t) = -\tan t \qquad \cot(-t) = -\cot t$

#56 §1.2

Show that cosine & secant are even.

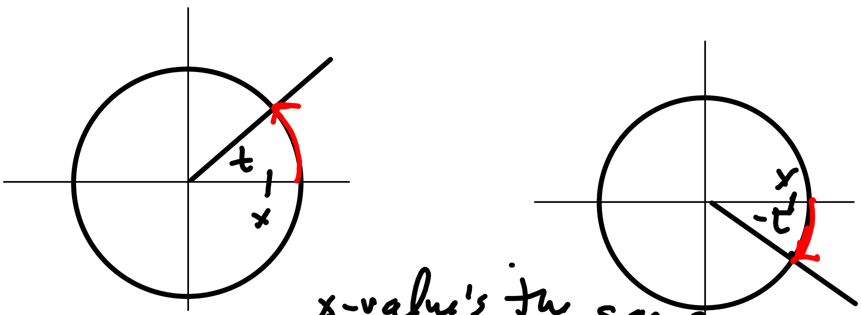
Given cosine is even, show secant is even.

$f(-x) = f(x)$

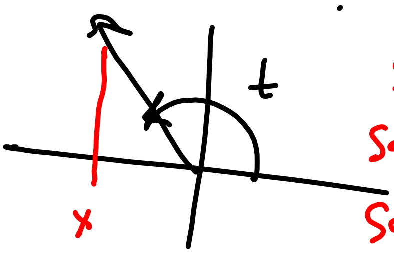


$$\sec(-t) = \frac{1}{\cos(-t)} = \frac{1}{\cos(t)} = \sec(t)$$

Show cosine is even.

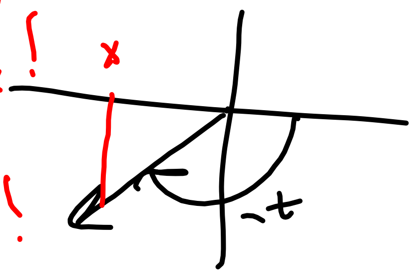


x-value's the same.



See? Same X!

Same cosine!



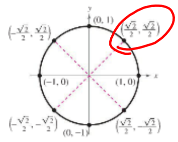


Figure 1.17

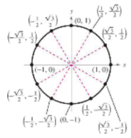


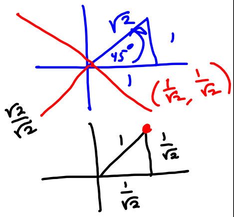
Figure 1.18

1. –/11 points LarTrig9 1.2.507.XP.

Use a unit circle divided into 8 equal parts to complete the table for selected values of t. (If an answer is u

t	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π
x	1	$\frac{\sqrt{2}}{2}$	0	$-\frac{\sqrt{2}}{2}$	−1
y	0	$\frac{\sqrt{2}}{2}$	1	$\frac{\sqrt{2}}{2}$	0
sin t	0	$\frac{\sqrt{2}}{2}$			
cos t	1	$\frac{\sqrt{2}}{2}$			
tan t		1		−1	

$\left(\frac{\pi}{4}\right)\left(\frac{180}{\pi}\right) = 45^\circ$



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

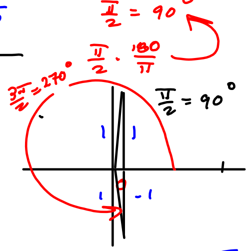
$\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

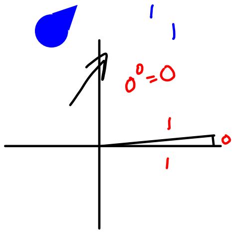
$1.732 \overline{)1.00000}$

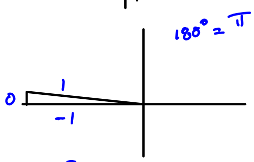
$3 \overline{)1.732}$

$\frac{\pi}{2} = 90^\circ$

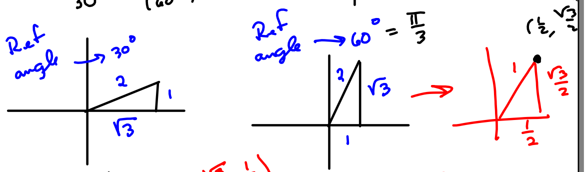
$\frac{\pi}{2} \cdot \frac{180}{\pi}$

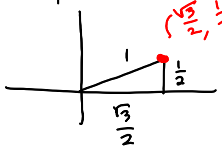






30° (60°)

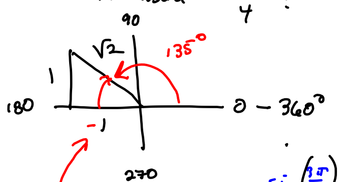




$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ ← unit circle point

what about $\frac{3\pi}{4}$?

$\frac{3\pi}{4} \cdot \frac{180}{\pi} = 135^\circ$



x is negative

Ref. Angle is 45°!

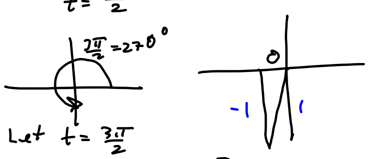
$\sin\left(\frac{3\pi}{4}\right) = \frac{1}{\sqrt{2}}$ $\csc\left(\frac{3\pi}{4}\right) = \sqrt{2}$

$\cos\left(\frac{3\pi}{4}\right) = -\frac{1}{\sqrt{2}}$ $\sec\left(\frac{3\pi}{4}\right) = -\sqrt{2}$

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

Quadrant angles

$t = \frac{3\pi}{2}$



Let $t = \frac{3\pi}{2}$

$\csc t = -1$ $\sin\left(\frac{3\pi}{2}\right) = -1$

$\sec t = \nexists$ $\cos\left(\frac{3\pi}{2}\right) = 0$

$0 = \frac{0}{1}$ $\cot t = \frac{0}{-1} = 0$ $\tan\left(\frac{3\pi}{2}\right) = \frac{-1}{0}$?! $\nexists$

has reciprocal

$\frac{1}{0}$ $\nexists$

2. –/1 points LarTrig9 1.2.506.XP.

Use a calculator to evaluate the trigonometric expression. Round your answer to four decimal places

cos(−1.8)

.2272

```
cos(-1.8
   -.2272020947
```

3. –/1 points LarTrig9 1.2.505.XP.MI.

Evaluate the trigonometric function using its period as an aid.

$\cos\left(-\frac{9\pi}{2}\right)$

Convert to degrees and look at the remainder upon division by 360.

Leave in radians and look at the remainder upon division by 2Pi.

$= -\frac{8\pi}{2} - \frac{\pi}{2}$

$= -4\pi - \frac{\pi}{2} = -\frac{\pi}{2}$ for trig ratios

Twice around circle

$\left(-\frac{9\pi}{2}\right)\left(\frac{180}{\pi}\right) = -810$

$\frac{810}{360} = 2.25$

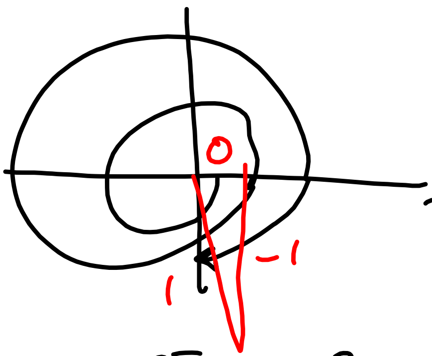
$(2)(360) = 720$

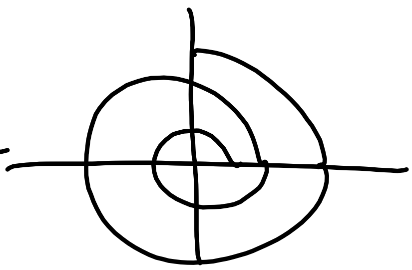
$810 - 720 = 90 =$ remainder.

But we're Negative

So $-90°$ not $+90°$

```
               13.5
810/360
               2.25
2*360
                720
810-720
                 90
```





$t = -\frac{9\pi}{2}$

So, $-90°$ for trig ratio purposes etc.

$\sin t = -1$

$\cos t = 0$

$\tan t = \cancel{\exists}$

4. –/2 points LarTrig9 1.2.504.XP.

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

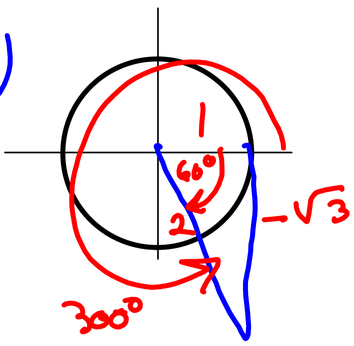
$t = \frac{5\pi}{3}$

$\left(\frac{5\pi}{3}\right)\left(\frac{180}{\pi}\right)$

$= 300°$

$(x, y) = \left(\cos\frac{5\pi}{3}, \sin\frac{5\pi}{3}\right)$

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



6. –/1 points LarTrig9 1.2.048.

Use a calculator to evaluate the trigonometric function. Round your answer to four decimal places. (Be sure the calculator is in the correct mode.)

cot −0.5

$\cot(-.5)$

$\boxed{\approx -1.8305}$

```
                2.25
2*360
                 720
810-720
                  90
1/tan(-.5)
        -1.830487722
```

$\cot x = \frac{1}{\tan x}$

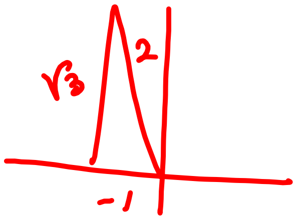
10. –/1 points LarTrig9 1.2.044.

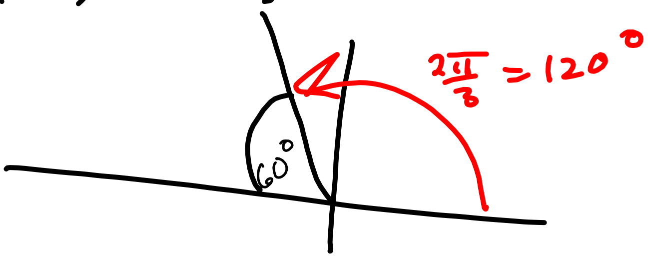
Use a calculator to evaluate the trigonometric function. Round your answer to four decimal places. (Be sure the calculator is in the correct mode.)

csc $2\pi/3$

$= \frac{2}{\sqrt{3}}$ meh. calculator should be used.

$\left(\frac{2\pi}{3}\right)\left(\frac{180}{\pi}\right) = 120^\circ$ Meh.





12. –/2 points LarTrig9 1.2.042.MI.

Use the value of the trigonometric function to evaluate the indicated functions.

$\boxed{\cos(t) = 4/5}$

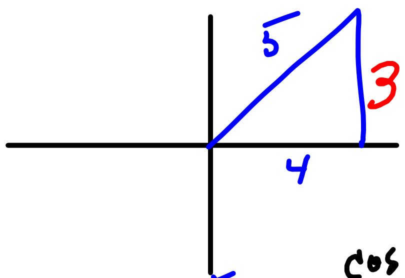
(a) $\cos(\pi - t)$

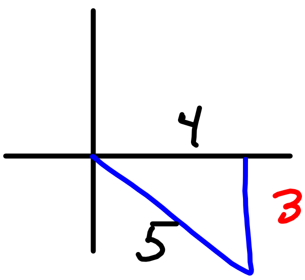
(b) $\cos(t + \pi)$

2 triangles

Cofunction ID's for future

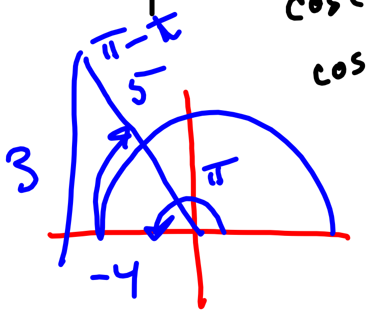
Pythagorus says:

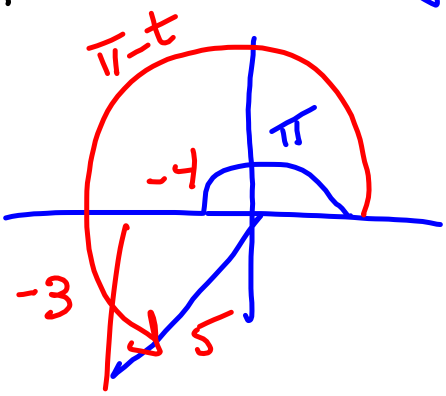




$\cos(\pi - t) = -\frac{4}{5}$

$\cos(\pi + t) = -\frac{4}{5}$





14. –/2 points LarTrig9 1.2.038.MI.

Use the value of the trigonometric function to evaluate the indicated functions.

$\sin(-t) = 8/9$

(a) $\sin(t)$ $= -8/9$

(b) $\csc(t)$ $= -\frac{9}{8}$

sin t is odd

15. –/1 points LarTrig9 1.2.036.

Evaluate the trigonometric function using its period as an aid.

$\sin\left(-\frac{8\pi}{3}\right)$

$-\frac{6\pi}{3} - \frac{2\pi}{3}$

$\to -\frac{2\pi}{3}$

2π. Inconsequential.

Saw this. Convert θ to degrees. Look @ remainder upon division by 360°.