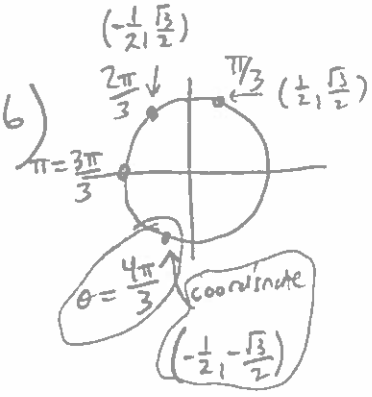
Homework 6 MATH 1540 Spring 2020

#29) $\frac{2\pi}{3}$ is in QII, so

$$\text{ref } \angle = \pi - \frac{2\pi}{3} = \frac{\pi}{3}$$

#46)




a) reference angle $= \theta - \pi$

$= \frac{4\pi}{3} - \frac{3\pi}{3}$

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

b) quadrant is QIII ($\Rightarrow$ sine is negative and cosine is negative)

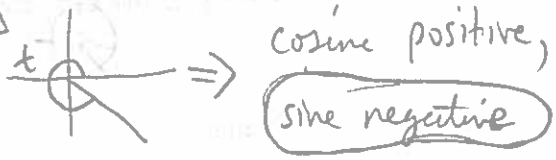
c) $\sin\left(\frac{4\pi}{3}\right) = -\sin\left(\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

(b/c QIII; ref $\angle$)

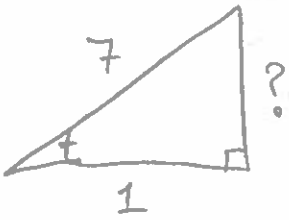
$\cos\left(\frac{4\pi}{3}\right) = -\cos\left(\frac{\pi}{3}\right) = -\frac{1}{2}$

#50] Given: $\cos(t) = \frac{1}{7}$, $t$ in QIV

Find: $\sin(t)$




Soln: Draw a $\Delta$ to match "$\cos(t) = \frac{1}{7}$" (1 ← adjacent, 7 ← hypotenuse, angle)




find ? w/ Pyth thm

$$1^2 + ?^2 = 7^2$$
$$\downarrow$$
$$?^2 = 48$$
$$\downarrow$$
$$? = \sqrt{48}$$

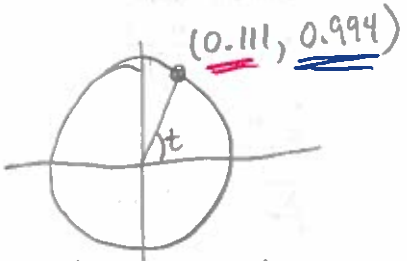
Now we can find $\sin(t)$:

$$\sin(t) = -\frac{\sqrt{48}}{7}$$

($\sqrt{48}$ ← opposite, 7 ← hyp.)

negative b/c $t$ is in QIV

#70] Given:




Find: $\sin(t)$ and $\cos t$

Soln: $\sin(t) =$ [2nd coordinate of point at angle $t$] $= 0.994$

$\cos(t) =$ [1st coordinate of point at angle $t$] $= 0.111$

#82) Use calculator to find $\sin\left(\frac{\pi}{10}\right)$

Soln: Don't forget to make sure in radian mode:

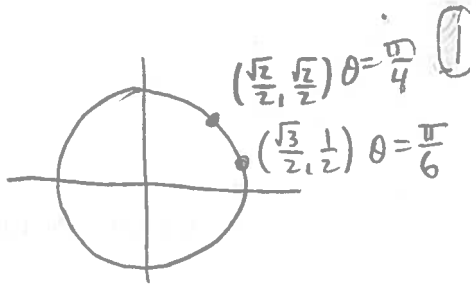
$$\sin\left(\frac{\pi}{10}\right) \approx 0.3090$$

#87) Use calculator to find $\cos(98^\circ)$

Soln: Don't forget to make sure in degree mode:

$$\cos(98^\circ) \approx -0.1391$$

§7.4



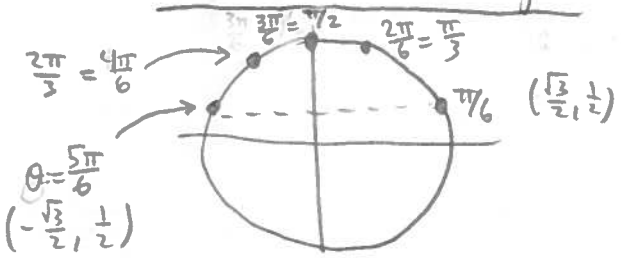

#8] $\csc(\frac{\pi}{6}) = \frac{1}{\sin(\pi/6)} = \frac{1}{1/2} = 2$

#9] $\cot(\frac{\pi}{6}) = \frac{\cos(\pi/6)}{\sin(\pi/6)} = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}$

#11] $\sec(\pi/4) = \frac{1}{\cos(\pi/4)} = \frac{1}{\sqrt{2}/2} = \frac{2}{\sqrt{2}}$

#18] $\tan(\frac{5\pi}{16})$

Without reference angles




$\Downarrow$

$\tan(\frac{5\pi}{6}) = \frac{\sin(\frac{5\pi}{6})}{\cos(\frac{5\pi}{6})}$

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

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

With reference angles

angle is $\frac{5\pi}{6}$ ~ in QII

$\Rightarrow$ ref $\angle = \frac{\pi}{6}$

Since angle in QII, $\tan(\frac{5\pi}{6})$ is negative.

Therefore,

$\tan(\frac{5\pi}{6}) = -\tan(\frac{\pi}{6})$

$= -\frac{\sin(\pi/6)}{\cos(\pi/6)}$

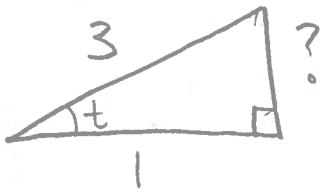
$= -(\frac{1/2}{\sqrt{3}/2})$

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

#39) Given: $\cos(t) = -\frac{1}{3}$ and $t$ in QIII

Find: $\sin(t)$, $\sec(t)$, $\csc(t)$, $\tan(t)$, and $\cot(t)$

Soln: First draw a $\Delta$ + label it so cosine is $\frac{1}{3}$ (can NOT make $-\frac{1}{3}$ appear since lengths are never negative)




Solve for the side labelled "?": use Pythagorean theorem to get

$$1^2 + ?^2 = 3^2 \rightarrow ?^2 = 9 - 1 = 8$$

$$\rightarrow ? = \sqrt{8}$$

Recall which functions are positive and negative in QIII:

| |
|---|
| $\cos(t) < 0$ |
| $\sin(t) < 0$ |
| $\tan(t) > 0$ |
| $\cot(t) > 0$ |
| $\sec(t) < 0$ |
| $\csc(t) < 0$ |

Now compute the trig functions:

$$\sin(t) = -\frac{opp}{hyp} = -\frac{\sqrt{8}}{3}$$

$$\sec(t) = -\frac{hyp}{adj} = -\frac{3}{1} = -3$$

$$\csc(t) = -\frac{hyp}{opp} = -\frac{3}{\sqrt{8}}$$

$$\tan(t) = +\frac{opp}{adj} = \frac{\sqrt{8}}{1} = \sqrt{8}$$

$$\cot(t) = +\frac{adj}{opp} = \frac{1}{\sqrt{8}}$$

#76 $y = 2\cos(x) + 5$

$x$ ← crank angle

If $x = 55°$, ~~then~~

$$y = 2\cos(55°) + 5 \approx 6.147$$