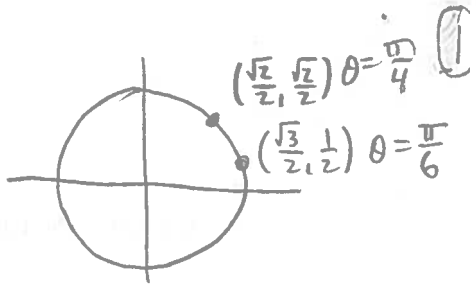
Homework 5 MATH 1540 Fall 2019



§7.4

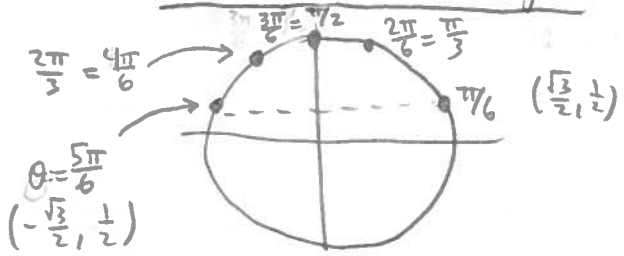
#8] $\csc(\frac{\pi}{6}) = \frac{1}{\sin(\pi/6)} = \frac{1}{1/2} = 2$

#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 $\frac{5\pi}{6} \sim$ in QII

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

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

Therefore,

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

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

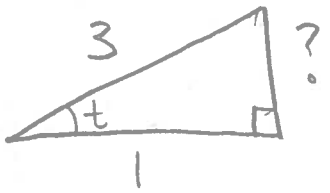
$= -\left(\frac{1/2}{\sqrt{3}/2}\right)$

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

#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 Δ + 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 $x = 55^\circ$, then

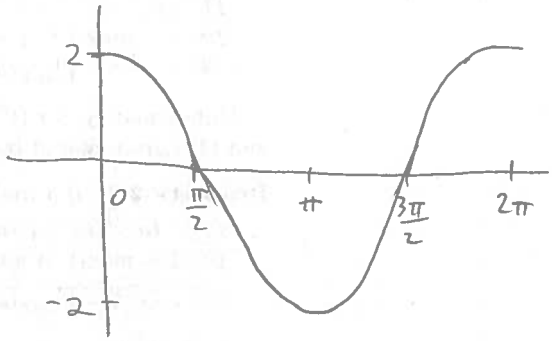
$y = 2\cos(55^\circ) + 5 \approx 6.147$

§8.1

#10] $y = 2\cos(x)$ (v. stretch / multiply y by 2)

Anchor points: $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$

y-values: 1, 0, −1 → mult. 2 → 2, 0, −2



#19] $y = -\cos(t + \frac{\pi}{3})$

(1st) h-shift left subtr. $\frac{\pi}{3}$ from anchor pts

(2nd) mult. y-values by (−1) (flip graph upside-down)

Anchor pts $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$ ↓ subtr. $\frac{\pi}{3}$

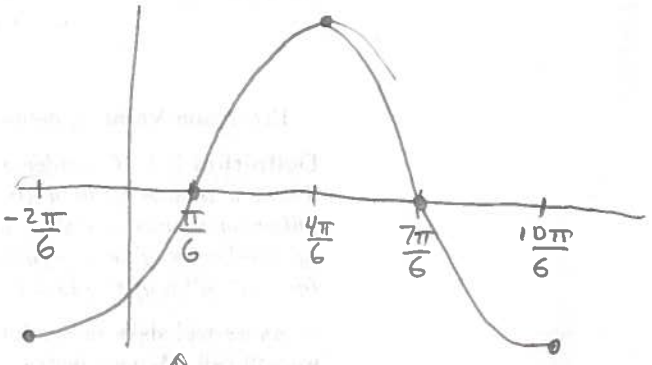
$-\frac{\pi}{3}, \frac{\pi}{6}, \frac{2\pi}{3}, \frac{7\pi}{6}, \frac{5\pi}{3} = \frac{10\pi}{6}$

$-\frac{2\pi}{6}$ $\quad$ $\frac{4\pi}{6}$ $\quad$ $\frac{10\pi}{6}$

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

$\frac{3\pi}{2} - \frac{\pi}{3} = \frac{9\pi}{6} - \frac{2\pi}{6} = \frac{7\pi}{6}$

$2\pi - \frac{\pi}{3} = \frac{6\pi}{3} - \frac{\pi}{3} = \frac{5\pi}{3}$



Upside-down b/c of negative sign!!

#22 $y = 4\sin\left(\frac{\pi}{2}(x-3)\right)+7$

- mult. y-vals by 4 (3rd)
- divide x-vals by $\pi/2$ (1st)
- add 3 to x-vals (2nd)
- add 7 to y-vals (4th)

Soln: Anchor points: $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$.

↓ div by $\frac{\pi}{2}$

$0, \frac{\pi/2}{\pi/2}=1, \frac{\pi}{\pi/2}=\frac{2\pi}{\pi}=2, 3, 4.$

↓ add 3

$3, 4, 5, 6, 7$

Y-values: