HOMEWORK #1

5.1: 5, 24
5.2: 8, 49
5.3: 22

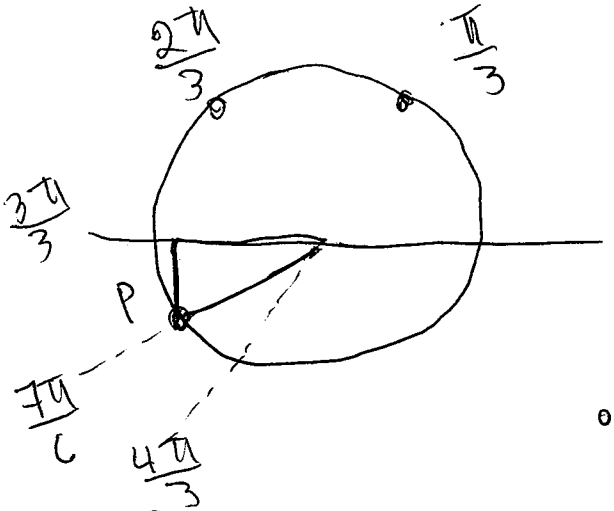
5.1:5: Verify that $\left(-\frac{\sqrt{5}}{3}, \frac{2}{3}\right)$ is on the unit circle.

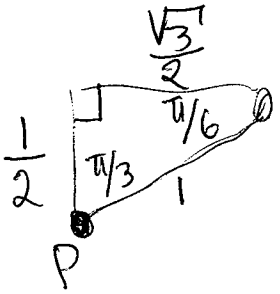
pf. We need to check that these coordinates satisfy $x^2+y^2=1$.

$$\left(\frac{-\sqrt{5}}{3}\right)^2 + \left(\frac{2}{3}\right)^2 = \frac{5}{9} + \frac{4}{9} = 1$$

5.1:24: Find the point on the unit circle corresponding to the angle $t = \frac{7\pi}{6}$.

ANS: $\frac{7\pi}{6} = \frac{6\pi}{6} + \frac{\pi}{6} = \pi + \frac{\pi}{6}$.





$30^\circ, 60^\circ, 90^\circ$ triangle

$\therefore P = \left(\cos\left(\frac{7\pi}{6}\right), \sin\left(\frac{7\pi}{6}\right)\right)$

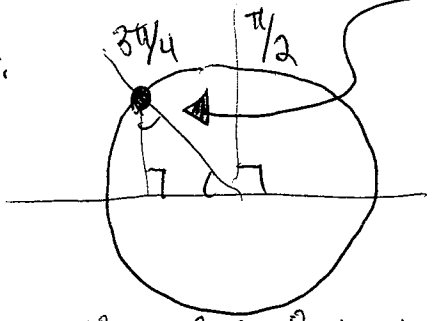
$= \left(-\sqrt{3}/2, -1/2\right)$.

4.10.

5.2:8 : Find exact values

(a) $\sin(3\pi/4)$

ANS:



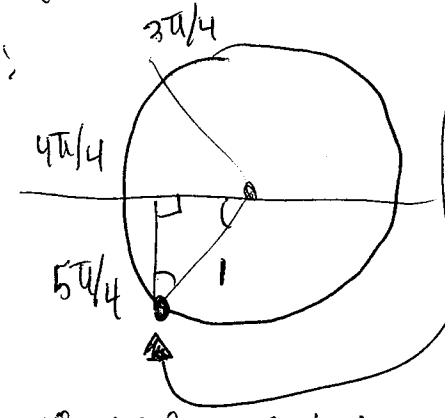
45°, 45°, 90° triangle

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

$$\therefore \boxed{\sin(3\pi/4) = \frac{1}{\sqrt{2}}}$$

(b) $\sin(5\pi/4)$

ANS:

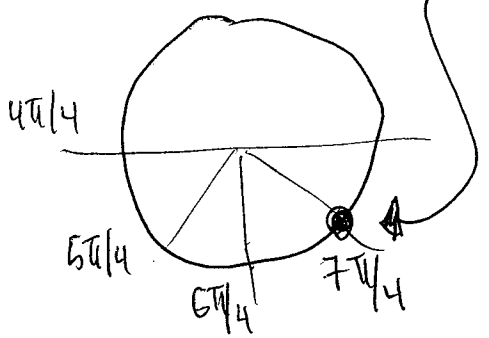


45°, 45°, 90° triangle

$$\left(\cos\left(\frac{5\pi}{4}\right), \sin\left(\frac{5\pi}{4}\right)\right) = \left(\frac{-1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$$

$$\therefore \boxed{\sin(5\pi/4) = \frac{-1}{\sqrt{2}}}$$

(c) $\sin(7\pi/4)$

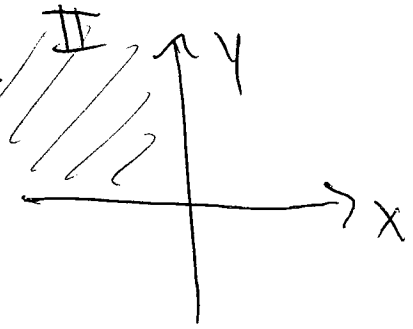


$$\left(\cos(7\pi/4), \sin(7\pi/4)\right) = \left(\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$$

$$\therefore \boxed{\sin(7\pi/4) = \frac{-1}{\sqrt{2}}}$$

5.2:49: If $\sin t > 0$ & $\cos t < 0$ then what quadrant is the point corresponding to t in?

ANS: $x = \cos t < 0$
$y = \sin t > 0$



the point corresponding to the angle t is $(\cos(t), \sin(t))$ and it lies in quadrant II. //

5.2:22: Find the amplitude and frequency of $y = 4\sin(-2x)$ and sketch graph.

SOLN:

$$\psi(x) = A\sin(\omega(x - x_0))$$

- x_0: phase shift.
- A: amplitude
- ω: angular frequency
- $\psi(x)$: In standard form all of these numbers should be positive!

$$\begin{aligned} 4\sin(-2x) &= -4\sin(2x) \\ &= 4\sin(2x + \pi/2) \\ &= 4\sin(2[x - (-\tfrac{\pi}{4})]) \end{aligned}$$

(STANDARD FORM)

$4\sin\left(2\left(x-\frac{\pi}{4}\right)\right)$ $\begin{cases} \boxed{A=4} \text{ amplitude} \\ \omega = 2 \\ x_0 = \pi/4 \end{cases}$

- Since $\omega = 2\pi f \Rightarrow \frac{\omega}{2\pi} = f$,

the frequency is $\frac{2}{2\pi} = \boxed{\frac{1}{\pi} = f}$.

- Since $T = \frac{1}{f} \Rightarrow T = \frac{1}{1/\pi} = \pi$,

the period is $\boxed{\pi = T}$

GRAPH OF $4\sin\left(2\left(x-\frac{\pi}{4}\right)\right)$