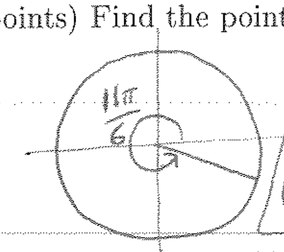
M1060-2 QUIZ 2 (Spencer Stirling) - September 9, 2010

Directions: You may attach more sheets if necessary. SHOW ALL WORK and CLEARLY mark your solutions.

1) (2 points) Find the point (x, y) on the unit circle that corresponds to the angle $t = \frac{11\pi}{6}$



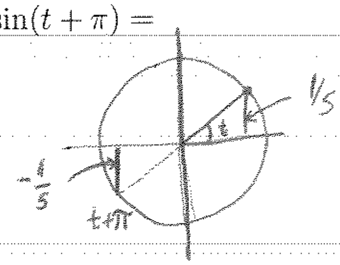
$\boxed{\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)}$

note: this is

$(\cos(t), \sin(t))$

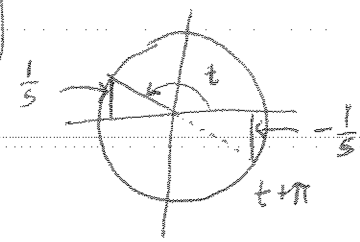
2) (4 points) Suppose $\sin(t) = 1/5$. Using properties of the sin() function (such as even/odd, etc), evaluate the following (hint: drawing the situation on the unit circle might help):

(a) $\sin(t + \pi) =$



so $\boxed{\sin(t+\pi) = -\frac{1}{5}}$

NOTE: these angles also work

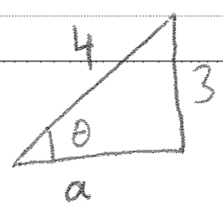


(b) $\sin(\pi - t) =$

remember: sin is odd function,

so $\sin(\pi - t) = \sin(-(t-\pi)) = -\sin(t-\pi) = -\left(-\frac{1}{5}\right) = \boxed{\frac{1}{5}}$

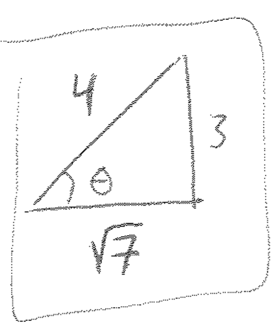
3) (3 points) Sketch a right triangle that satisfies $\sin(\theta) = 3/4$. Label the length of all of the legs (hint: use the Pythagorean theorem). Once you've done this, compute $\cos(\theta)$.



soh-cah-toa $\sin(\theta) = \frac{opp}{hyp}$

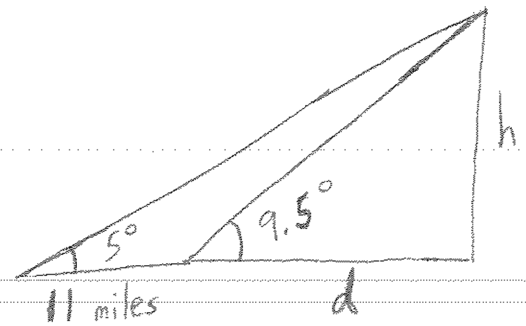
Now $a^2 + 3^2 = 4^2 \Longrightarrow a^2 = 7 \rightarrow a = \sqrt{7}$

so have



$\cos(\theta) = \frac{adj}{hyp} = \boxed{\frac{\sqrt{7}}{4} = \cos(\theta)}$

4) (5 points) In traveling across flat land, you notice a mountain directly in front of you. It's angle of elevation (to the peak) is 5°. After you drive 11 miles closer to the mountain, the angle of elevation is 9.5°. Approximate the height of the mountain.



Gather information:

$$\tan(5^\circ) = \frac{h}{11+d}$$

$$\tan(9.5^\circ) = \frac{h}{d} \Rightarrow d = \frac{h}{\tan(9.5^\circ)}$$

Plugging this into first equation we get

$$\tan(5^\circ) = \frac{h}{11 + \frac{h}{\tan(9.5^\circ)}}$$

solve for h: $11(\tan(5^\circ)) + h\frac{\tan(5^\circ)}{\tan(9.5^\circ)} = h$

so $11\tan(5^\circ) = h\left(1 - \frac{\tan(5^\circ)}{\tan(9.5^\circ)}\right)$

$$\Rightarrow h = \frac{11\tan(5^\circ)}{1 - \frac{\tan(5^\circ)}{\tan(9^\circ)}} \Rightarrow h = \frac{0.962375}{0.447618} \text{ miles}$$

$$\boxed{h \cong 2.14999 \text{ miles}}$$