Pre-Calculus Chapter 3 Review Name Key

1. Find exact radian measure of:
   a. 45° $\frac{\pi}{4}$ b. 135° $\frac{3\pi}{4}$ c. -270° $\frac{-3\pi}{2}$

2. Find the degree measure of:
   a. $\frac{4\pi}{3}$ 240° b. $\frac{11\pi}{6}$ 330° c. 3π 540°

$\frac{\pi}{3} \cdot 4$ $60 \cdot 4$ $\frac{\pi}{6} \cdot 11 \rightarrow 30 \cdot 11$ $\pi \cdot 3 \rightarrow 180 \cdot 3$

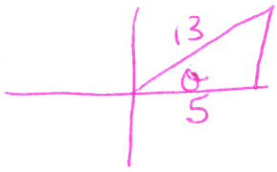
3. Show how to find the decimal approximation for the degree measure of:
   a. 7.2 radians b. 4.6 radians

$\frac{7.2 \text{ rads}}{1} \cdot \frac{180°}{\pi \text{ rads}} = \frac{1296°}{\pi} \approx 412.53°$

$\frac{4.6 \text{ rads}}{1} \cdot \frac{180°}{\pi \text{ rads}} = \frac{828°}{\pi} \approx 263.56°$

4. A. Draw a sketch illustrating the angle $\cos^{-1}(\frac{5}{13})$

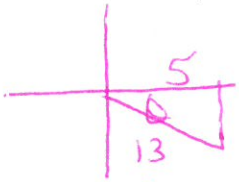
* Principal Quadrant $\cos\theta = \frac{5}{13}$ → ratio is pos, so Quad I



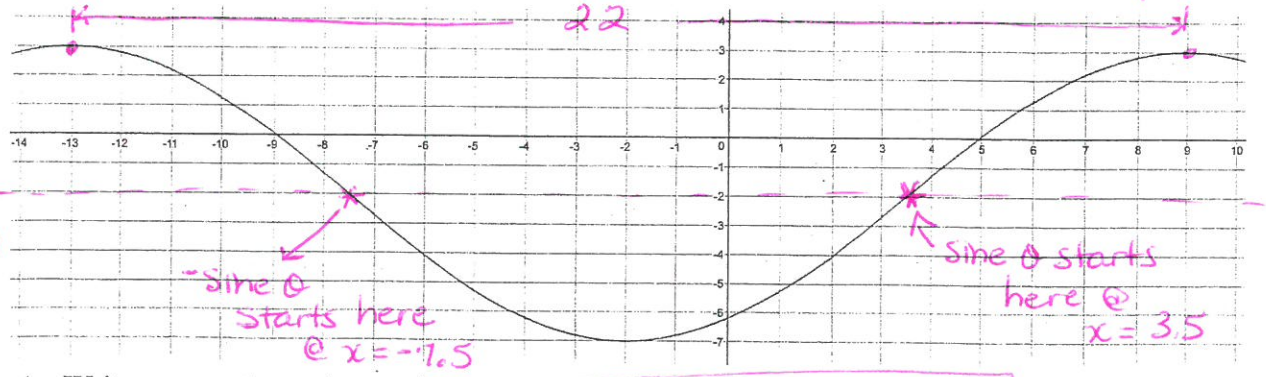
B. Show another angle equal to arccos $(\frac{5}{13})$ that terminates in a different quadrant.

$\pm\cos^{-1}(\frac{5}{13})$

* Secondary Quadrant $\cos\theta = \frac{5}{13}$ → ratio is also pos in Quad IV



5.



$2\pi * hd = 22$ $hd = \frac{22}{2\pi}$ $hd = \frac{11}{\pi}$

A. Write an equation using cosine. $y = -2 + 5\cos\frac{\pi}{11}(x+13)$ ph. disp. could also be $(x-9)$

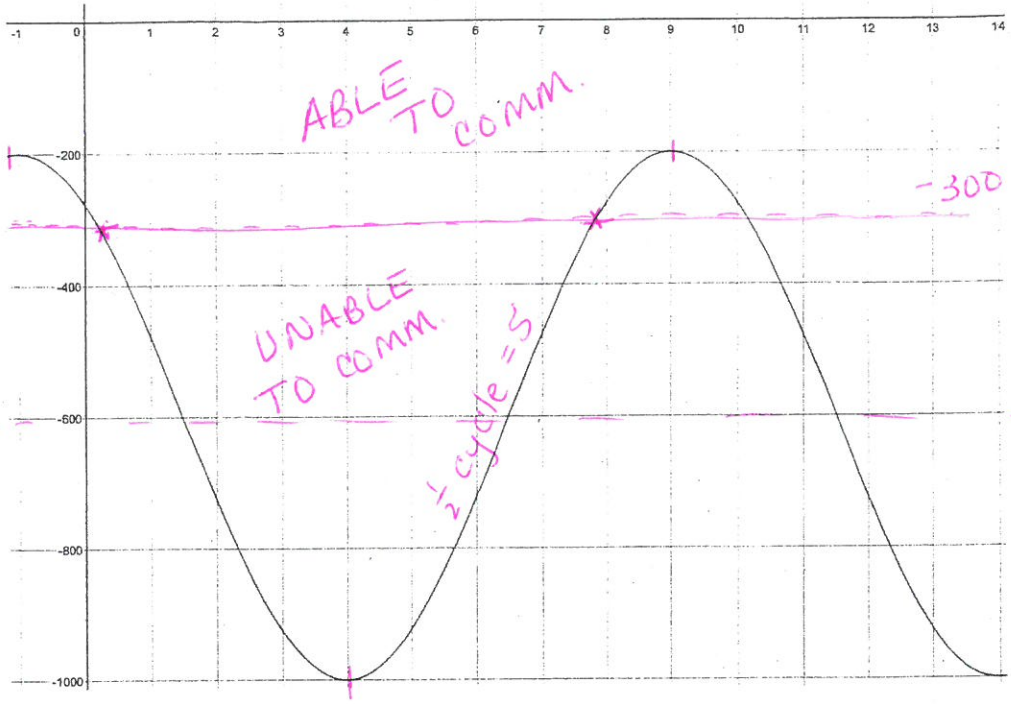
B. Write an equation using sine.

Since period is 22 $\frac{1}{4}$ period is 5.5

$y = -2 + 5\sin\frac{\pi}{11}(x-3.5)$

$y = -2 - 5\sin\frac{\pi}{11}(x+7.5)$

6. *Porpoising Problem*: Assume that you are aboard a research submarine doing submerged training exercises in the Pacific Ocean. At time t = 0 you start porpoising (alternately deeper and then shallower). At time t = 4 minutes you are at your deepest, y = -1000 meters. At time t = 9 min you next reach your shallowest, y = -200m.



$2\pi * hd = 10$

$hd = \frac{10}{2\pi}$

$hd = \frac{5}{\pi}$

a. Find an equation expressing y as a function of t.

$y(t) = -600 + 400\cos\frac{\pi}{5}(t+1)$ or $(t-9)$

b. Your submarine can't communicate with ships on the surface when it is deeper than y = -300 m. At time t = 0, could your submarine communicate? How did you arrive at your answer?

plug 0 in for t

$y = -600 + 400\cos\frac{\pi}{5}(0+1)$

$-600 + 400\cos\frac{\pi}{5}$

$y(0) = -276.4$

so, yes

c. Between what two nonnegative times is your submarine first **unable** to communicate?

$-300 = -600 + 400\cos\frac{\pi}{5}(t+1)$

$\frac{3}{4} = \cos\frac{\pi}{5}(t+1)$

$\pm\cos^{-1}\left(\frac{3}{4}\right) + 2\pi n = \frac{\pi}{5}(t+1)$

$\frac{5}{\pi}\left[\pm .723 + 2\pi n\right] = t+1$

$\pm 1.15 + 10n = t+1$

$-1 \pm 1.15 + 10n = t$

$-1 + 1.15 = 0.15 + 10n$

$-1 - 1.15 = -2.15 + 10n$

0.15, 10.15, 20.15

7.85, 17.85, 27.85

Between 0.15 and 7.85 mins.