Math-19 Exam #5

Name: _____

This exam is closed book and notes. You may use a calculator; however, no cell phones or tablets are allowed. Show all work; there is no credit for guessed answers. All values should be exact with no decimals unless you are specifically asked for an approximate or decimal answer. Be careful to check for extraneous solutions.

problem	score
1	
2	
3	
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TOTAL	

1). Consider the angle $\theta = -42°$.

    a). Convert to radians (leave the answer reduced and in terms of π).

    b). Find a coterminal angle in the interval $[0, 2\pi]$.

2). Consider the trigonometric function:

$$f(t) = -2\cos\left(2t + \frac{\pi}{3}\right)$$

a). What is the amplitude?

$A =$

b). What is the angular frequency?

$\omega =$

c). What is the period?

$T =$

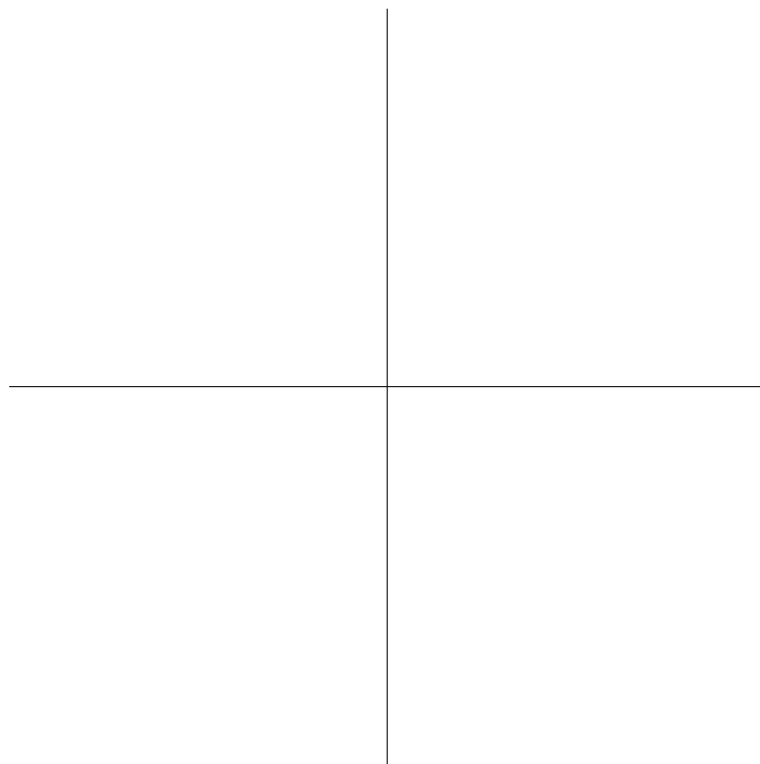d). What is the horizontal translation?

$b =$ to the:

e). What is the phase angle?

$\phi =$

f). Sketch one period of the graph from $[b, b + T]$. Be sure to label the four key t values and use dotted lines to indicate the amplitude.

3). Consider the trigonometric function:

$$f(t) = 2\tan\left[2\pi\left(t - \frac{1}{4}\right)\right]$$
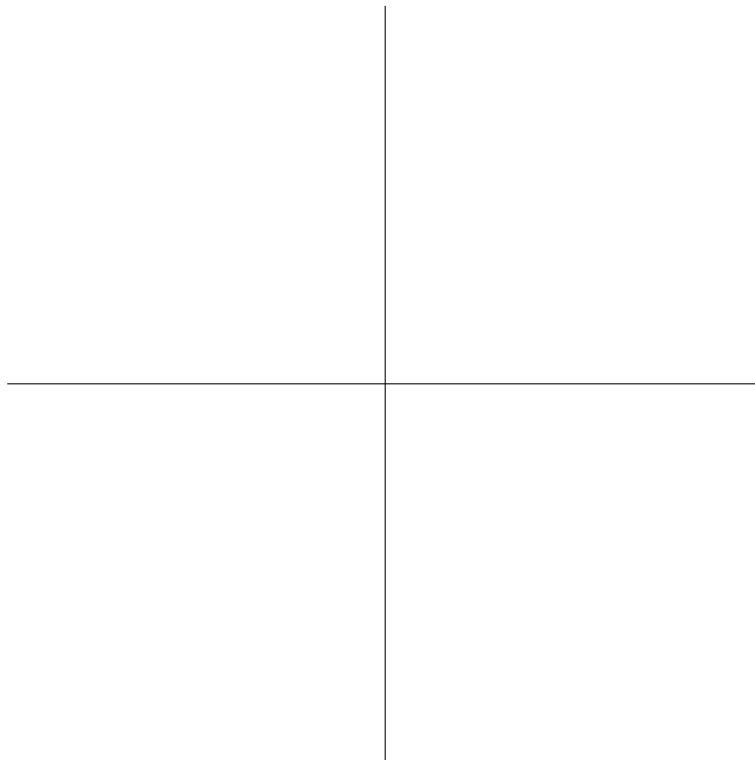
a). What is the angular frequency?

$$\omega =$$

b). What is the period?

$$T =$$

c). What is the horizontal translation?

$$b = \qquad\qquad \text{to the:}$$

d). Sketch one period of the graph from $\left(b - \dfrac{T}{2}, b + \dfrac{T}{2}\right)$. Be sure to show the asymptotes at the ends of the interval and label the zero.

4). Evaluate the following expressions:

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

5). Evaluate the following expressions:

$$\sin\left(\tan^{-1}\frac{1}{2}\right)$$

6). Rewrite the following expression in terms of x:

$$\tan\left(\cos^{-1}\frac{x}{\sqrt{1-x^2}}\right)$$

7). A car has 12 in tires that are rotating at 800 rpm. Assuming no slippage between the tires and the road, how fast is the car traveling (in mph)?

8). A plane passes directly over a control tower. A radar sensor that is located 500 ft from the tower determines that the angle of elevation to the plane is $72°$. What is the elevation of the plane (to the nearest foot)?

9). Two observers on shore are 1000 ft apart and are viewing a ship on the water according to the following diagram:
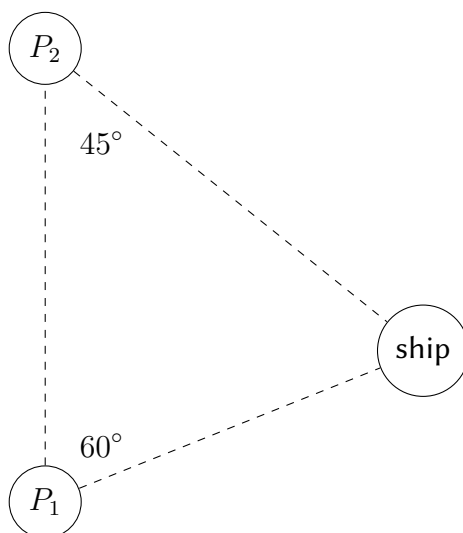
How far is the ship from person 1 (to the nearest foot)?

10). A particle undergoes damped harmonic motion in one dimension about the equilibrium position $x = 0$. Let $x(t)$ denote the particle's position at time t. At $f(0) = 5$ the particle is at its right-most position for the first cycle. At $f(1) = -4$ the particle is at its left-most position for the first cycle. Recall that the equation for this type of motion is:

$$f(t) = Ae^{-kt} \cos \omega t$$

a). Identify the following values:

$A =$

$T =$

$\omega =$

b). Calculate k. Round your answer to two significant digits.