Math-19 Practice Exam #5

1). Consider the angle $\theta = -55°$.

    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:

$$f(t) = 3\sin(4t - \pi)$$

    a). What is the amplitude?

    $A =$

    b). What is the angular frequency?
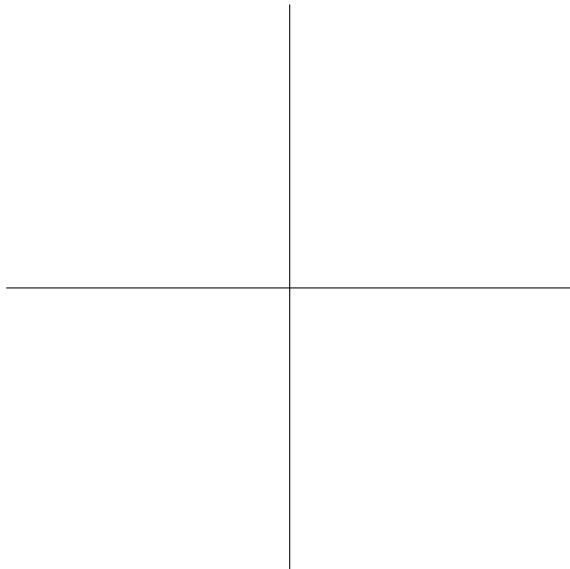
    $\omega =$

    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:

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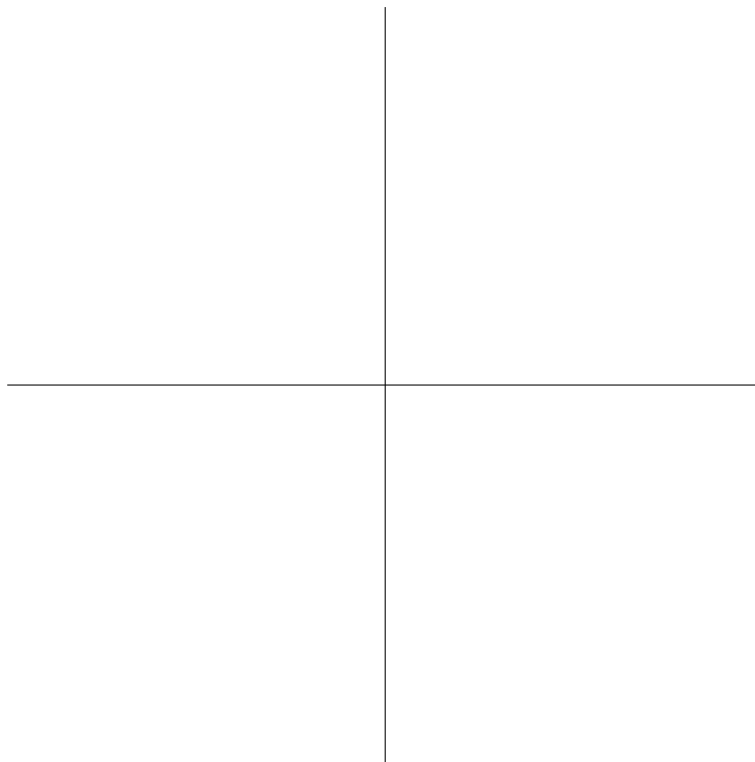
a). What is the angular frequency?

$\omega =$

b). What is the period?

$T =$

c). What is the horizontal translation?

$b =$ 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:

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

5). Evaluate the following expressions:

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

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

$$\cot\left(\sin^{-1}\frac{x}{4}\right)$$

7). The typical windmill used for electricity generation has blades that are 116 ft long and turn at about 20 rpm. How fast are the tips of the blades moving (in mph)?

8). A guy (support) wire is connected from the ground to the top of a pole. The end of the guy wire is 10 feet from the pole and makes an angle of elevation of $70°$ with the ground. How tall is the pole (to the nearest tenth of a foot)?

9). Two people are walking in the park when they see a bird fly by. At some point in time, the angle of elevation from the first person to the bird is $50°$ and the angle of elevation from the second person to the bird is $75°$. The distance between the two people is 50 ft. What is the distance between the bird and the second person (to the nearest tenth of a 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 $f(0) = 10$ the particle is at its right-most position for the first cycle. At $f(1) = -7$ the particle reaches 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.