Accel Precalc Worksheet: Harmonic Motion Name _____

Unit 6: Graphs and Inverses of Trig Functions

1. The top of a spring is attached to the ceiling and the bottom is attached to a weight which is oscillating vertically so that the weight is furthest from the ceiling every 4 seconds. Find $y(t) = A\sin(Bt - C) + D$, where t is the time in seconds and y(t) is the distance of the weight from the ceiling in feet, given the following:

   a. The maximum distance of the weight from the ceiling is 8 ft and the minimum distance from the ceiling is 2 ft, which occurs at t = 0 sec.

   b. The maximum distance of the weight from the ceiling is 6 ft , which occurs a t = I sec and the minimum distance from the ceiling is 3 ft.

   c. The average distance of the weight from the ceiling is 7 ft and the maximum distance of the weight from the ceiling is 10 ft which occurs at t = 3 sec.

   d. The distance between the maximum and minimum distances from the ceiling is 5 ft. At t = 4 sec the weight attains its maximum distance of 9 ft from the ceiling.

2. In a particular harbor, high and low tides occur twice each 24 hours. Find $h(t) = A\sin(Bt - C) + D$ where h(t) is the water level t hours after midnight given the following:

   a. High tide is 6 ft and low tide, which occurs at 4 am is 2 ft.

   b. The average water level is 8 ft and high tide is 10 ft, which occurs at 11 pm.

3. In a particular harbor, high and low tide occur twice each 24 hours. Find $h(t) = A\cos(Bt - C) + D$ where $h(t)$ is the water level, in feet, t hours after midnight given the following:

   a. High tide is 8 ft and low tide, which occurs at 5 am, is 2 ft.

   b. The average water level is 7 ft and high tide is 10 ft, which occurs at 8 pm.

4. Determine a function in the form $y = A\sin(Bt - C) + D$ which oscillates between -2 and 6, has period 4, and passes through the point $(t, y) = (1, 6)$.

5. Determine a function of the form $y = A\cos(Bt - C) + D$ which oscillates between -6 and 2, has period 3π, and passes through the point $(t, y) = (\pi/2, -6)$

6. Determine a function of the form $y = A\sin(Bt - C) + D$ which oscillates between -4 and 10, has period π, and passes through the point $(t, y) = (\pi/2, 10)$.

7. Determine a function of the form $y = A\sin(Bt - C) + D$ which oscillates between 8 and 14, has period $\pi/2$, and passes through the point $(t, y) = (\pi/4, 8)$.