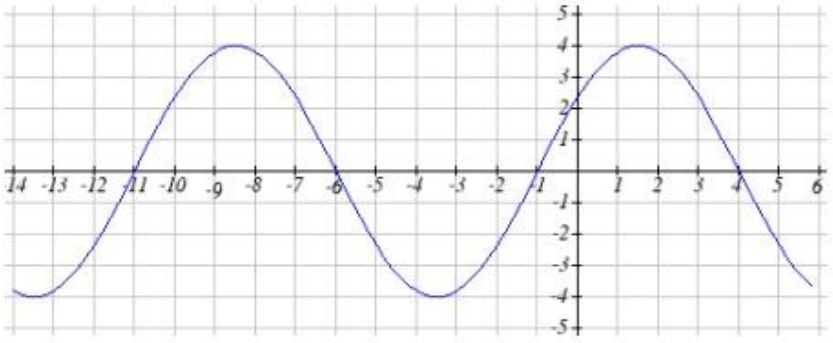
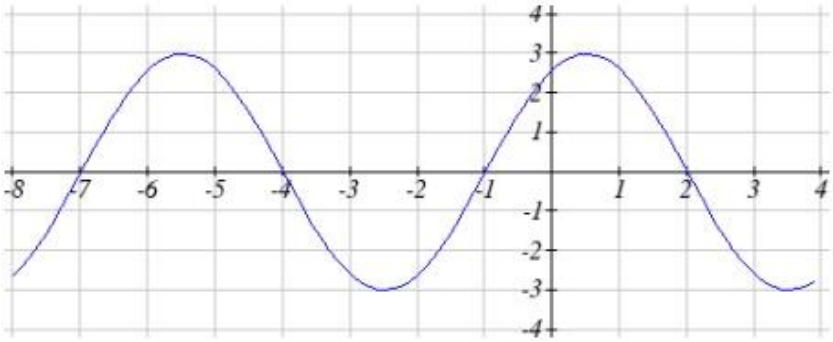
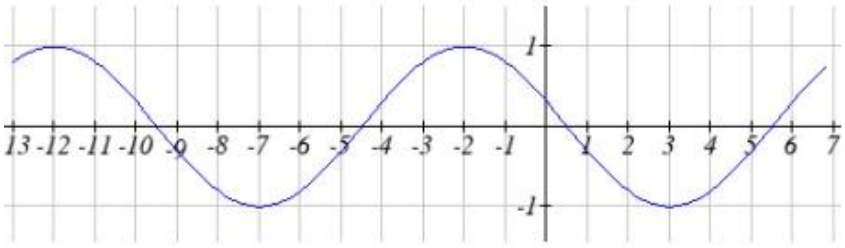
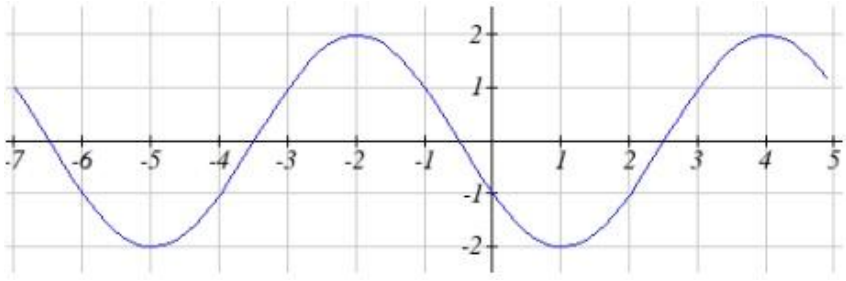
HW 4.3.5: Modeling with Sinusoidal Functions

Find a formula for each of the functions graphed below

1. 

2. 

3. 

4. 

5. A Ferris wheel is 25 meters in diameter and boarded from a platform that is 1 meters above the ground. The six o'clock position on the Ferris wheel is level with the loading platform. The wheel completes 1 full revolution in 10 minutes. The function $h(t)$ gives your height in meters above the ground *t* minutes after the wheel begins to turn.

a. Find the amplitude, average, and period of $h(t)$.

b. Find a formula for the height function $h(t)$.

6. A Ferris wheel is 35 meters in diameter and boarded from a platform that is 3 meters above the ground. The six o'clock position on the Ferris wheel is level with the loading platform. The wheel completes 1 full revolution in 8 minutes. The function $h(t)$ gives your height in meters above the ground *t* minutes after the wheel begins to turn.

a. Find the amplitude, average, and period of $h(t)$.

b. Find a formula for the height function $h(t)$.

7. A Ferris wheel with a radius of 25 feet is rotating at a rate of 3 revolutions per minute. The lowest chair is 5 feet above the ground. After everyone gets on, you are on an axis parallel to the ground and through the center of the Ferris wheel, $t = 0$. Write a model for the height *h* (in feet) of the chair as a function of time *t* (in seconds).

8. Outside temperature over the course of a day can be modeled as a sinusoidal function. Suppose you know the temperature is 50 degrees at midnight and the high and low temperatures during the day are 57 and 43 degrees, respectively. Assuming *t* is the number of hours since midnight, find a function for the temperature, *D*, in terms of *t*.

9. Outside temperature over the course of a day can be modeled as a sinusoidal function. Suppose you know the temperature is 56 degrees at midnight and the high and low temperatures during the day are 80 and 56 degrees, respectively. Assuming *t* is the number of hours since midnight, find a function for the temperature, *D*, in terms of *t*.

10. The paddle wheel of a steamship is 13 feet in diameter and revolves 30 times per minute when moving at top speed. Using this speed and starting from a point at the very top of the wheel, write a model for the *h* height (in feet) of the end of a paddle relative to the water's surface as function of time *t* (in seconds). (Assume the paddle is 2 feet below the water's surface at its lowest point.)

Answers

1-4 Answers may vary

1. $y = 4\cos\left(\frac{\pi}{5}(x - 1.5)\right)$
2. $y = 3\cos\left(\frac{\pi}{3}(x - 0.5)\right)$
3. $y = \cos\left(\frac{\pi}{5}(x + 2)\right)$
4. $y = 2\cos\left(\frac{\pi}{3}(x + 2)\right)$
5. $y = 13.5 - 12.5\cos\left(\frac{\pi}{5}x\right)$
6. $y = 20.5 - 17.5\cos\left(\frac{\pi}{4}x\right)$
7. $y = 30 + 25\sin\left(\frac{\pi}{10}x\right)$
8. $y = 50 + 7\sin\left(\frac{\pi}{12}x\right)$
9. $y = 68 - 12\cos\left(\frac{\pi}{12}x\right)$
10. $y = 4.5 + 6.5\cos(\pi x)$