HW 4.3.5: Modeling with Sinusoidal Functions

Find a formula for each of the functions graphed below.

1.

2.

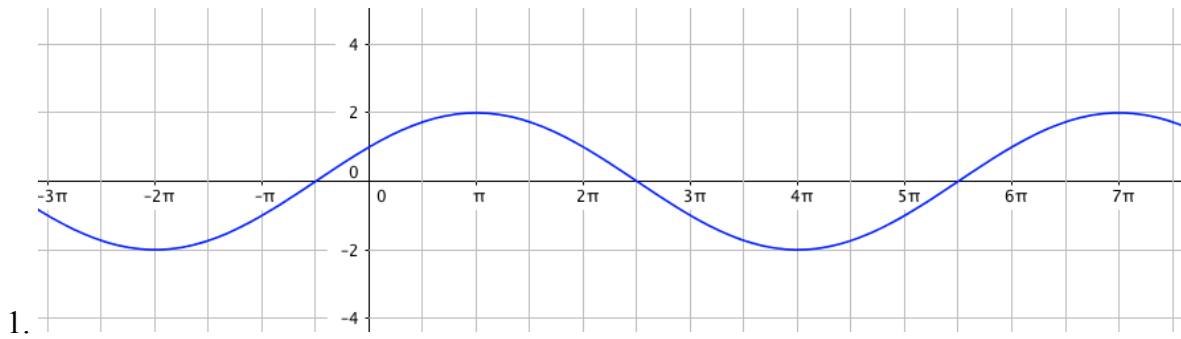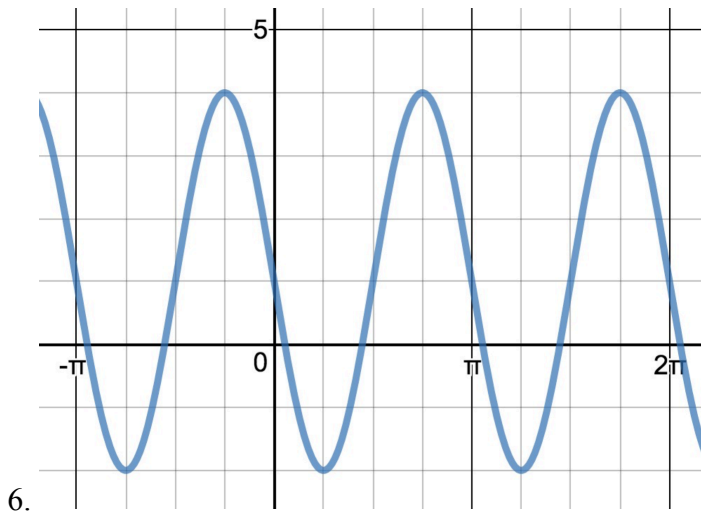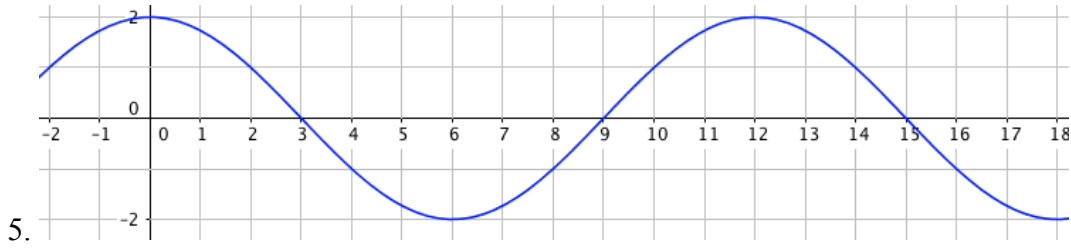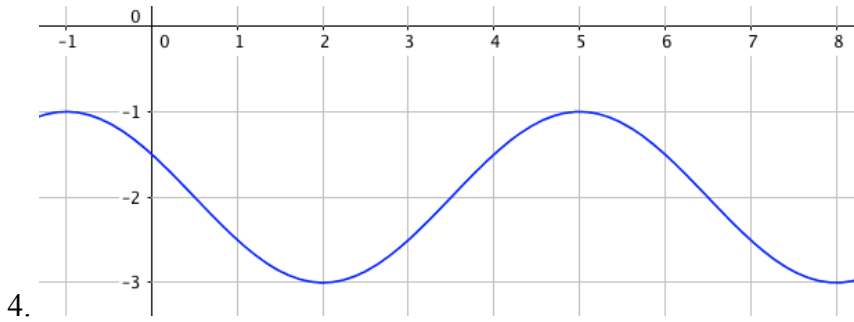
3.

4.

5.

6.
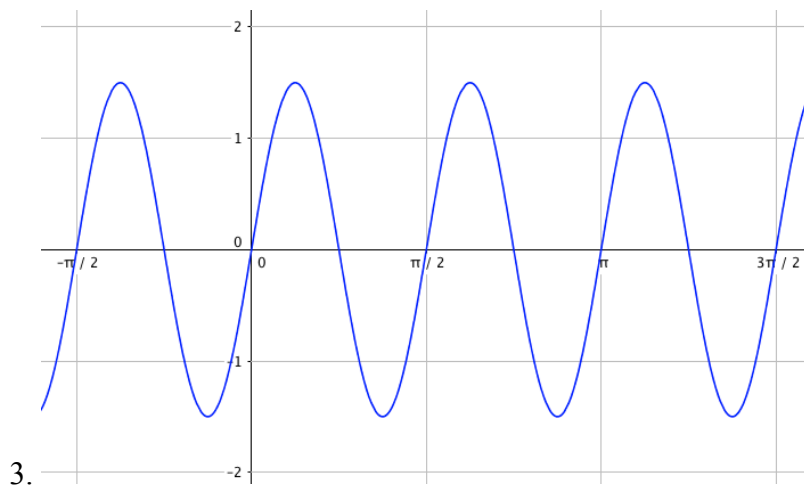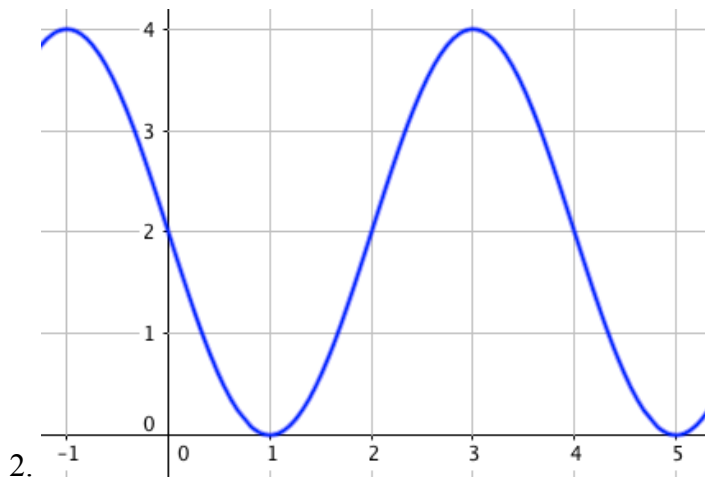
7. A Ferris wheel is 20 meters in diameter and is attached to a platform that is 2 meters above the ground. The six o'clock position on the Ferris wheel rests on the platform. The wheel completes 1 full revolution in 8 minutes. The function $h(t)$ gives your height in meters above the ground t minutes after the wheel begins to turn.

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

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

8. The percentage of the moon's surface that is visible to someone on the Earth varies due to the time since the previous full moon. The moon passes through a full cycle in 28 days. The maximum percentage of the moon's surface that is visible from Earth is 50%. Find a function for the percentage, P, of the surface that is visible as a function of the number of days, t, since the pervious full moon.

9. The temperature is 80 degrees at noon, and the high and low temperatures during the day are 90 and 70 degrees, respectively. Assuming t is the number of hours since noon, find a function for the temperature, D, in terms of t.

10. A tire is 22 inches in diameter and rests on a platform that is 4 meters above the ground. The six o'clock position on the tire is level with the platform. A piece of gum stuck to the three o'clock position of the tire completes 1 full revolution in 12 seconds. The function $h(t)$ gives the height of the piece of gum in inches above the ground t seconds after the tire begins to turn. Find a formula for the height function $h(t)$.

Answers:

(Answers may vary for 1-6.)

1. $y = 2\cos\left(\dfrac{1}{3}(x-\pi)\right)$

2. $y = 2\sin\left(\dfrac{\pi}{2}(x-2)\right)+2$

3. $y = \dfrac{3}{2}\sin\left(4\left(x-\dfrac{\pi}{2}\right)\right)$

4. $y = \cos\left(\dfrac{\pi}{3}(x+1)\right)-2$

5. $y = 2\sin\left(\dfrac{\pi}{6}(x+3)\right)$

6. $y = 3\cos\left(2\left(x+\dfrac{\pi}{4}\right)\right)+1$

7. $y = 12 - 10\cos\left(\dfrac{\pi}{4}x\right)$

8. $y = 25 + 25\cos\left(\dfrac{\pi}{14}x\right)$

9. $y = 80 + 10\sin\left(\dfrac{\pi}{12}x\right)$

10. $y = 15 - 11\sin\left(\dfrac{\pi}{6}x\right)$