

Section 4.5

Sinusoidal Functions

For the sinusoidal functions

$$y = a \sin(bx - c) + k \quad \text{and} \quad y = a \cos(bx - c) + k,$$

- $|a|$ is the amplitude
- $\frac{c}{b}$ is the horizontal shift
- $\frac{2\pi}{b}$ is the period.
- $y = k$ is the midline.
- The left and right endpoints of a one-cycle interval can be determined by solving the equations $bx - c = 0$ and $bx - c = 2\pi$.

Problem 1. Sketch the graph of the function. Include two full periods.

a) $y = \sin x$

b) $y = \cos x$

c) $y = 3 \sin 6x$

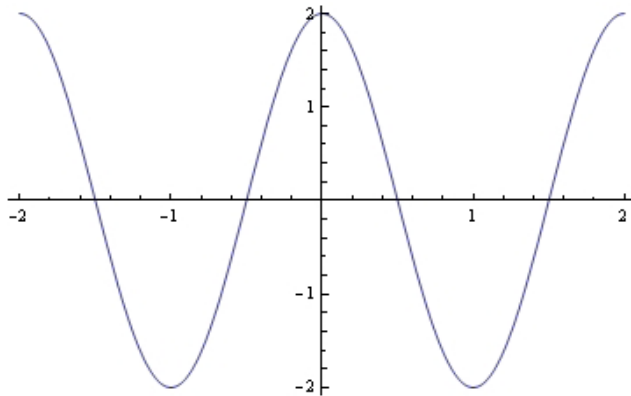
d) $y = 2 \cos\left(x - \frac{\pi}{4}\right)$

e) $y = -4 \sin\left(\frac{\pi t}{6}\right) + 2$

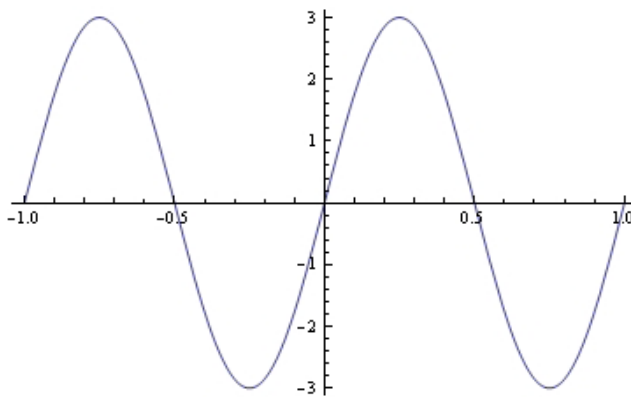
f) $y = 3 \sin\left(2\pi x + \frac{\pi}{2}\right) - 2$

Problem 2. Find a possible formula for the graphs.

a)



b)



Problem 3. Find a formula, using the sine or cosine function, for your height above the ground after t minutes on the Ferris wheel. Graph the function to check that it is correct. A Ferris wheel is 60 meters in diameter and is boarded at ground level. The wheel completes one full revolution every 8 minutes. At $t = 0$ you are at ground level (the 6 o'clock position) and ascending.

Homework: Read section 4.5, do #9, 19, 35, 45, 59, 65, 73, 79