Exercise 2

In Exercises 1–2, find a period of the given function and sketch its graph.

(a) $\sin 7\pi x$,

(b) $\sin n\pi x$ (n an integer),

(c) $\cos mx$ (m an integer),

(d) $\sin x + \cos x$,

(e) $\sin^2 2x$.

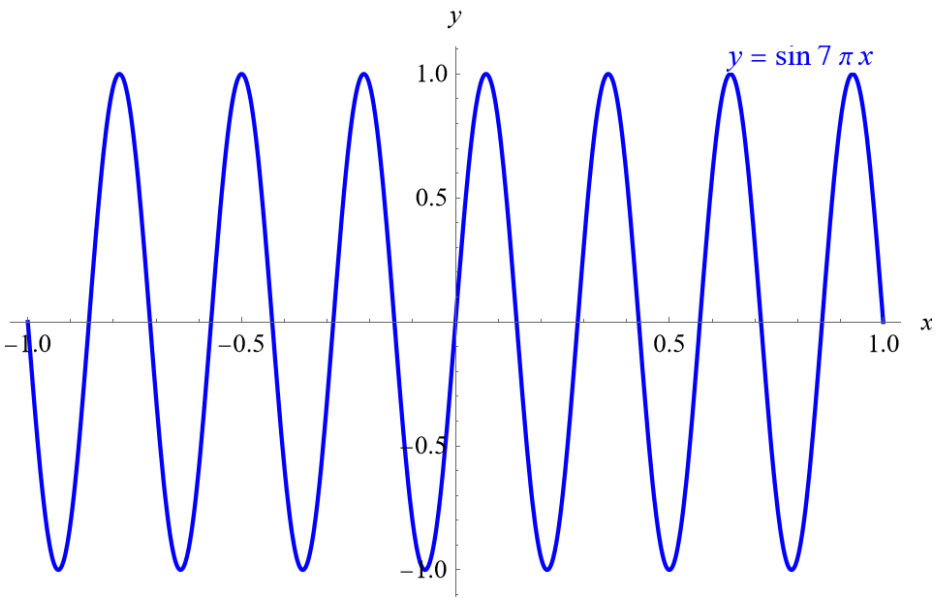
Solution

Part (a)

The period of $\sin 7\pi x$ is

$$T = \frac{2\pi}{7\pi} = \frac{2}{7}.$$

Below is a graph of $\sin 7\pi x$ versus x. Notice that the graph repeats itself every $2/7$ units.

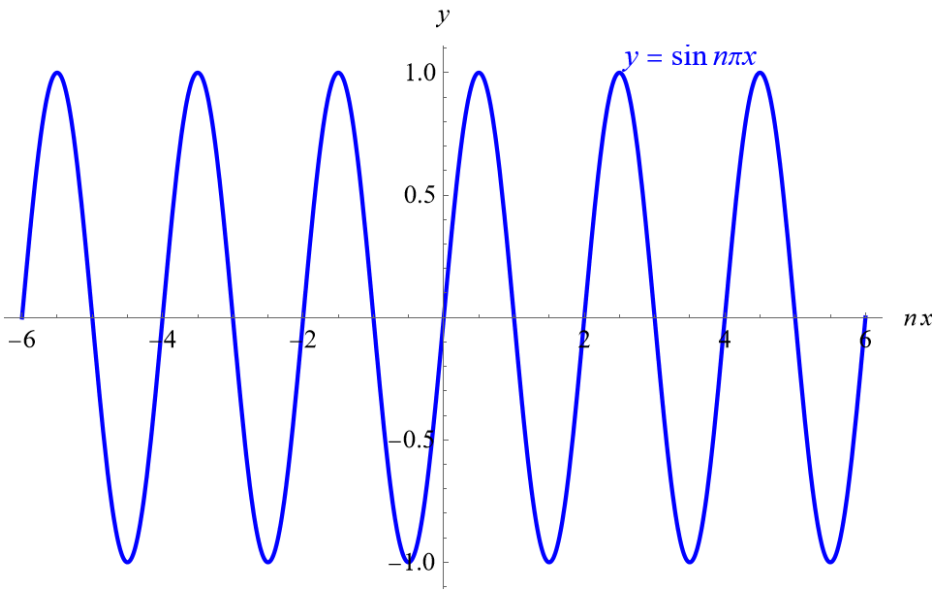


Part (b)

The period of $\sin n\pi x$ is

$$T = \frac{2\pi}{n\pi} = \frac{2}{n}.$$

Below is a graph of $\sin n\pi x$ versus nx. Notice that the graph repeats itself every 2 units.

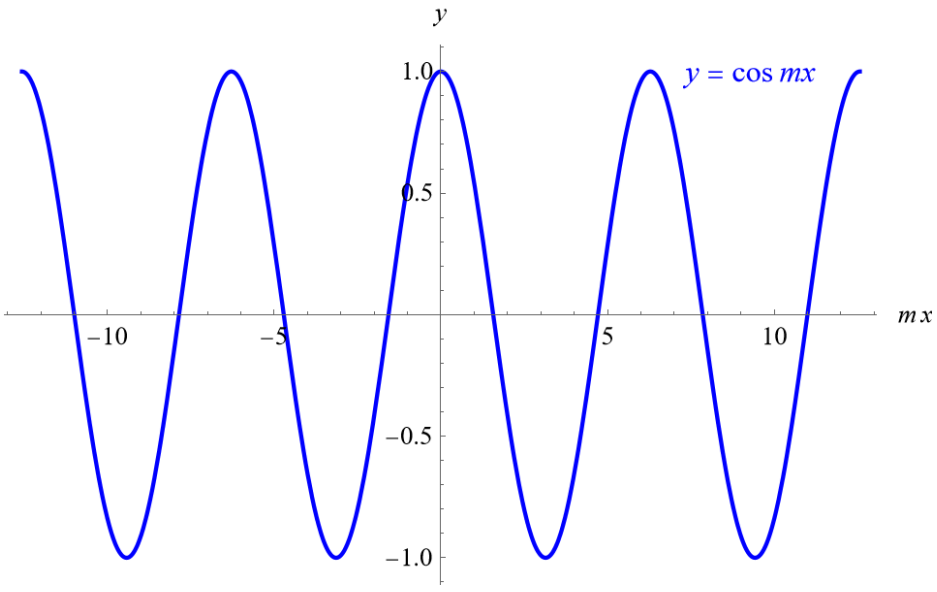


Part (c)

The period of $\cos mx$ is

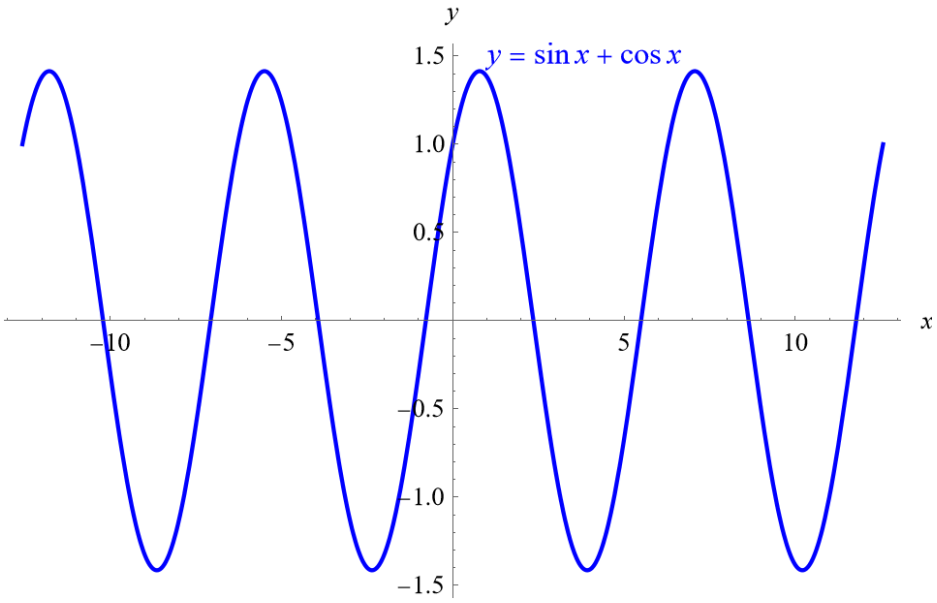
$$T = \frac{2\pi}{m}.$$

Below is a graph of $\cos mx$ versus mx. Notice that the graph repeats itself every 2π units.



Part (d)

The period of $\sin x$ is $\frac{2\pi}{1} = 2\pi$, and the period of $\cos x$ is $\frac{2\pi}{1} = 2\pi$. The least common multiple of 2π and 2π is 2π, so this is the period of $\sin x + \cos x$.



Part (e)

The period of $\sin^2 2x = \frac{1}{2}(1 - \cos 4x)$ is $\frac{2\pi}{4} = \frac{\pi}{2}$, so the graph repeats itself every $\pi/2$ units.