

Lesson 6.4 Math Lab: Assess Your Understanding, page 512

Use graphing technology.

1. Explain why each of $y = \sin x$, $y = \cos x$, and $y = \tan x$ is a function.



Any vertical line drawn through a point x in the domain intersects the graph of each function in exactly one point.

2. Graph $y = \sin x$ for $-4\pi \leq x \leq 4\pi$.
Identify the domain, range, and zeros of the graph.
Write a general expression that represents the zeros.



The domain is: $-4\pi \leq x \leq 4\pi$; the range is: $-1 \leq y \leq 1$
The zeros are: $\pm 4\pi, \pm 3\pi, \pm 2\pi, \pm \pi, 0$
A general expression for the zeros is: $k\pi, k \in \mathbb{Z}$

3. Repeat question 2 for $y = \cos x$ for $-4\pi \leq x \leq 4\pi$.



The domain is: $-4\pi \leq x \leq 4\pi$; the range is: $-1 \leq y \leq 1$
The zeros are: $\pm \frac{7\pi}{2}, \pm \frac{5\pi}{2}, \pm \frac{3\pi}{2}, \pm \frac{\pi}{2}$
The zeros are the products of all odd integers and $\frac{\pi}{2}$.
A general expression for the zeros is: $(2k + 1)\frac{\pi}{2}, k \in \mathbb{Z}$

4. Repeat question 2 for $y = \tan x$ for $-4\pi \leq x \leq 4\pi$.
Identify the equations of the asymptotes and write a general expression that represents them.



The domain is: $x \neq \pm \frac{\pi}{2}, x \neq \pm \frac{3\pi}{2}, x \neq \pm \frac{5\pi}{2}, x \neq \pm \frac{7\pi}{2}$
The range is: $y \in \mathbb{R}$
The zeros are: $\pm 4\pi, \pm 3\pi, \pm 2\pi, \pm \pi, 0$
A general expression for the zeros is: $k\pi, k \in \mathbb{Z}$
The equations of the asymptotes are: $x = \pm \frac{\pi}{2}; x = \pm \frac{3\pi}{2}; x = \pm \frac{5\pi}{2};$
and $x = \pm \frac{7\pi}{2}$
A general expression for these equations is: $x = (2k + 1)\frac{\pi}{2}, k \in \mathbb{Z}$