

1. Let $f(x) = \sec\left(\frac{1}{2}x\right)$. Which of the following is a vertical asymptote on the graph of f ?

- (A) $x = 0$ (B) $x = \frac{\pi}{4}$ (C) $x = \frac{\pi}{2}$ (D) $x = \pi$

2. In the xy -plane, the graph of which of the following functions has a vertical asymptote at $x = \frac{\pi}{2}$?

- (A) $f(x) = \csc(x)$ (B) $f(x) = \csc(2x)$ (C) $f(x) = \sec\left(x - \frac{\pi}{2}\right)$ (D) $f(x) = \sec\left(\frac{1}{2}x\right)$

3. In the xy -plane, the graph of which of the following functions has a vertical asymptote at $x = 2$?

- (A) $f(x) = \csc\left(\frac{1}{2}x\right)$ (B) $f(x) = \csc(2x)$ (C) $f(x) = \sec(\pi x)$ (D) $f(x) = \sec\left(\frac{\pi}{4}x\right)$

4. Let $g(x) = \cot(2x)$. Which of the following is a vertical asymptote on the graph of g ?

- (A) $x = \frac{\pi}{6}$ (B) $x = \frac{\pi}{4}$ (C) $x = \frac{\pi}{3}$ (D) $x = \frac{\pi}{2}$

5. Let $h(x) = 3\sec(4x) + 1$. Which of the following statements about the graph of h is correct?

- (A) The graph of h has vertical asymptotes when $x = \frac{\pi}{8} + \frac{\pi}{4}k$, where k is an integer.

- (B) The graph of h has vertical asymptotes when $x = \frac{\pi}{4} + \frac{\pi}{2}k$, where k is an integer.

- (C) The graph of h has vertical asymptotes when $x = \frac{\pi}{2} + \frac{\pi}{4}k$, where k is an integer.

- (D) The graph of h has vertical asymptotes when $x = 2\pi + 4\pi k$, where k is an integer.

6. Let $h(x) = 5 \sec\left(\frac{1}{2}x\right)$. Which of the following gives the range of h ?
- (A) $(-\infty, -1] \cup [1, \infty)$ (B) $(-\infty, -5] \cup [5, \infty)$ (C) $(-\infty, -2] \cup [2, \infty)$ (D) $[-5, 5]$
7. Let $k(x) = 4 \csc(2x) - 1$. Which of the following gives the range of k ?
- (A) $(-\infty, -1] \cup [1, \infty)$ (B) $(-\infty, -4] \cup [4, \infty)$ (C) $(-\infty, -5] \cup [3, \infty)$ (D) $\left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{1}{2}, \infty\right)$
8. Let $f(x) = 2 \sec(x) - 5$ and $g(x) = -1$. In the xy -plane, what are the x -coordinates of the points of intersection of the graphs of f and g for $0 \leq x < 2\pi$?
9. Let $h(x) = 2 - 3 \csc x$ and $k(x) = 5$. In the xy -plane, what are the x -coordinates of the points of intersection of the graphs of h and k for $0 \leq x < 2\pi$?
10. Let $m(x) = 3 \csc^2 x - 2$ and $p(x) = 2$. In the xy -plane, what are the x -coordinates of the points of intersection of the graphs of m and p for $0 \leq x < 2\pi$?
-  11. Let $f(x) = 2 + 3.1 \cot(0.3x + 5)$. In the xy -plane, what are the x -coordinates of the points of where $f(x) = -6$ for $0 \leq x < 2\pi$?