

Write your questions
and thoughts here!Use the function $f(x) = \frac{x^2+2x-8}{x^2+x-12}$ to answer the following.

1. Identify all vertical asymptotes.

2. Evaluate $\lim_{x \rightarrow 3^-} f(x)$ 3. Evaluate $\lim_{x \rightarrow 3^+} f(x)$ **Find the limit.**

4. $\lim_{x \rightarrow 3^+} \frac{1-x}{x-3}$

5. $\lim_{x \rightarrow 1} \frac{x-3}{x^2-2x+1}$

1.14 Infinite Limits and Vertical Asymptotes**Practice**

Calculus

Identify the vertical asymptotes of each function.

1. $f(x) = \frac{x-6}{x^2-9x+18}$

2. $f(x) = \frac{2x^2-x-3}{3x^2+4x+1}$

3. $f(x) = \frac{x^2-x-12}{x+7}$

4. $f(x) = \frac{3x^2-11x+10}{x-2}$

5. $f(x) = \frac{x^3+2x^2-24x}{x^2-x}$

6. $f(x) = \frac{7x^2+4x-3}{7x-3}$

7. $f(x) = \csc(2x)$ on the interval $[0, \pi]$

8. $f(x) = \sec\left(\frac{x}{2}\right)$ on the interval $[-\pi, \pi]$

Evaluate the limit.

9. $\lim_{x \rightarrow 1^+} \frac{x^2}{x-1}$

10. $\lim_{x \rightarrow -2^-} \frac{-3}{x+2}$

11. $\lim_{x \rightarrow 1^+} \frac{x-2}{x^2-3x+2}$

12. $\lim_{x \rightarrow -2} \frac{x+3}{x^2+4x+4}$

13. $\lim_{x \rightarrow -1} \frac{x-1}{x^2-x-2}$

14. $\lim_{x \rightarrow 3} \frac{x^2}{3x-9}$

15. $\lim_{x \rightarrow -3} \frac{x-1}{x^2+6x+9}$

1.14 Infinite Limits and Vertical Asymptotes

16. $\lim_{x \rightarrow 0^+} \frac{\cos x}{x} =$

- (A) $-\infty$ (B) -1 (C) 0 (D) 1 (E) ∞
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17. Consider the functions $f(x) = \frac{1}{x}$, $x \neq 0$, and $g(x) = x \sin \frac{1}{x}$, $x \neq 0$. Which of the following describes the behavior of f and g as $x \rightarrow 0$?

- (A) $\lim_{x \rightarrow 0} f(x) = 0$ and $\lim_{x \rightarrow 0} g(x) = 0$ (B) $\lim_{x \rightarrow 0} f(x)$ and $\lim_{x \rightarrow 0} g(x)$ do not exist.
(C) $\lim_{x \rightarrow 0} f(x) = 0$ and $\lim_{x \rightarrow 0} g(x)$ does not exist. (D) $\lim_{x \rightarrow 0} f(x)$ does not exist and $\lim_{x \rightarrow 0} g(x) = 0$
(E) $\lim_{x \rightarrow 0} f(x) = \infty$ and $\lim_{x \rightarrow 0} g(x) = 0$
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18. CHALLENGING PROBLEM! The function h is defined by $h(x) = \left(\frac{x^2 - x - 20}{x + 4}\right) \ln \left(\frac{x^2 + 10x + 25}{x^2 + 5x}\right)$. At what values of x does the graph of h have a vertical asymptote?

- (A) $x = -5$ only (B) $x = 0$ only
(C) $x = -5$ and $x = 0$ only (D) $x = -5$, $x = 0$ and $x = -4$