

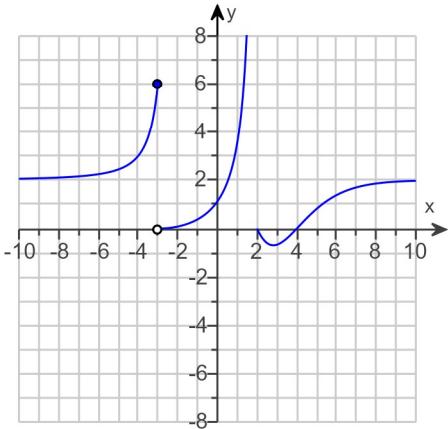
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Date: 09/02/19

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Course: Calc 1 11:30 AM / Internet
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Assignment: 2.6 Limits Involving Infinity;
Asymptotes of Graph

1.

- Using the following graph of the function f , evaluate the limits
(a) through (i).



(a) Select the correct choice below and fill in the answer box within the choice.

A. $\lim_{x \rightarrow 4} f(x) =$ 0

B. $\lim_{x \rightarrow 4} f(x)$ does not exist.

(b) $\lim_{x \rightarrow -3^+} f(x) =$ 0

(c) $\lim_{x \rightarrow -3^-} f(x) =$ 6

(d) Select the correct choice below and fill in the answer box within the choice.

A. $\lim_{x \rightarrow -3} f(x) =$

B. $\lim_{x \rightarrow -3} f(x)$ does not exist.

(e) $\lim_{x \rightarrow 2^+} f(x) =$ 0

(f) $\lim_{x \rightarrow 2^-} f(x) =$ ∞

(g) Select the correct choice below and fill in the answer box within the choice.

A. $\lim_{x \rightarrow 2} f(x) =$

B. $\lim_{x \rightarrow 2} f(x)$ does not exist.

(h) $\lim_{x \rightarrow \infty} f(x) =$ 2

(i) $\lim_{x \rightarrow -\infty} f(x) =$ 2

2. Find the limit of $f(x) = \frac{5}{x} - 4$ as x approaches ∞ and as x approaches $-\infty$.

$$\lim_{x \rightarrow \infty} f(x) = \text{ } -4$$

(Type a simplified fraction.)

$$\lim_{x \rightarrow -\infty} f(x) = \text{ } -4$$

(Type a simplified fraction.)

3. Find the limit of the function **a.** as $x \rightarrow \infty$ and **b.** as $x \rightarrow -\infty$.

$$g(x) = \frac{11}{13 + (1/x)}$$

a. Find the limit.

$$\lim_{x \rightarrow \infty} \frac{11}{13 + (1/x)} = \frac{11}{13}$$

(Simplify your answer.)

b. Find the limit.

$$\lim_{x \rightarrow -\infty} \frac{11}{13 + (1/x)} = \frac{11}{13}$$

(Simplify your answer.)

4. Find the limit.

$$\lim_{x \rightarrow \infty} \frac{\sin 11x}{6x}$$

$$\lim_{x \rightarrow \infty} \frac{\sin 11x}{6x} = 0$$

(Simplify your answer.)

5. Find the limit of $f(x) = \frac{4x+3}{9x+9}$ as x approaches ∞ and as x approaches $-\infty$.

$$\lim_{x \rightarrow \infty} f(x) = \frac{4}{9}$$

(Type a simplified fraction.)

$$\lim_{x \rightarrow -\infty} f(x) = \frac{4}{9}$$

(Type a simplified fraction.)

6. Find the limit of the rational function **a.** as $x \rightarrow \infty$ and **b.** as $x \rightarrow -\infty$.

$$h(x) = \frac{18x^3}{14x^3 + 20x^2 + 2x}$$

$$\text{a. } \lim_{x \rightarrow \infty} \frac{18x^3}{14x^3 + 20x^2 + 2x} = \frac{9}{7}$$

(Simplify your answer.)

$$\text{b. } \lim_{x \rightarrow -\infty} \frac{18x^3}{14x^3 + 20x^2 + 2x} = \frac{9}{7}$$

(Simplify your answer.)

7. Find the limit of $f(x) = \frac{6x^9 + 3x^8 + 5}{2x^{10}}$ as x approaches ∞ and as x approaches $-\infty$.

$$\lim_{x \rightarrow \infty} f(x) = \boxed{0}$$

(Type a simplified fraction.)

$$\lim_{x \rightarrow -\infty} f(x) = \boxed{0}$$

(Type a simplified fraction.)

8. Find $\lim_{x \rightarrow \infty} \sqrt[4]{\frac{9 + 16x^5}{x^5 + 2}}$.

$$\lim_{x \rightarrow \infty} \sqrt[4]{\frac{9 + 16x^5}{x^5 + 2}} = \boxed{2}$$

9. Find the following limit.

$$\lim_{x \rightarrow -\infty} \left(\frac{1 - x^4}{x^2 + 4x} \right)^5$$

$$\lim_{x \rightarrow -\infty} \left(\frac{1 - x^4}{x^2 + 4x} \right)^5 = \boxed{-\infty} \quad (\text{Simplify your answer.})$$

10. Find the limit of $f(x) = \frac{9\sqrt{x} + x^{-7}}{7x - 5}$ as x approaches ∞ .

$$\lim_{x \rightarrow \infty} f(x) = \boxed{0}$$

(Type an integer or a simplified fraction.)

11. Find the limit.

$$\lim_{x \rightarrow 0^-} \frac{1}{7x}$$

$$\lim_{x \rightarrow 0^-} \frac{1}{7x} = \boxed{-\infty}$$

(Simplify your answer.)

12. Find the limit.

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

$$\lim_{x \rightarrow 9^-} \frac{2}{x - 9} = \boxed{-\infty} \quad (\text{Simplify your answer.})$$

13. Find the limit.

$$\lim_{x \rightarrow 1} \frac{4}{(x - 1)^2}$$

$$\lim_{x \rightarrow 1} \frac{4}{(x - 1)^2} = \boxed{\infty} \quad (\text{Simplify your answer.})$$

14. Find the limit.

$$\lim_{x \rightarrow 0} \frac{6}{x^{8/5}}$$

$$\lim_{x \rightarrow 0} \frac{6}{x^{8/5}} = \boxed{\infty}$$

(Simplify your answer.)

15. Find $\lim_{x^2 - 9}$ as

- a. $x \rightarrow 3^+$ b. $x \rightarrow 3^-$ c. $x \rightarrow -3^+$ d. $x \rightarrow -3^-$

a. $\lim_{x \rightarrow 3^+} \frac{2}{x^2 - 9} = \boxed{\infty} \quad (\text{Simplify your answer.})$

b. $\lim_{x \rightarrow 3^-} \frac{2}{x^2 - 9} = \boxed{-\infty} \quad (\text{Simplify your answer.})$

c. $\lim_{x \rightarrow -3^+} \frac{2}{x^2 - 9} = \boxed{-\infty} \quad (\text{Simplify your answer.})$

d. $\lim_{x \rightarrow -3^-} \frac{2}{x^2 - 9} = \boxed{\infty} \quad (\text{Simplify your answer.})$

16.

Find $\lim_{x \rightarrow 0^+} \frac{x^2 - 11x + 30}{x^3 - 6x^2}$ as

- a. $x \rightarrow 0^+$ b. $x \rightarrow 6^+$ c. $x \rightarrow 6^-$ d. $x \rightarrow 6$

e. Determine what, if anything, can be said about the limit as $x \rightarrow 0$.

a. $\lim_{x \rightarrow 0^+} \frac{x^2 - 11x + 30}{x^3 - 6x^2} =$ (Simplify your answer.)

b. $\lim_{x \rightarrow 6^+} \frac{x^2 - 11x + 30}{x^3 - 6x^2} =$ (Simplify your answer.)

c. $\lim_{x \rightarrow 6^-} \frac{x^2 - 11x + 30}{x^3 - 6x^2} =$ (Simplify your answer.)

d. $\lim_{x \rightarrow 6} \frac{x^2 - 11x + 30}{x^3 - 6x^2} =$ (Simplify your answer.)

e. What, if anything, can be said about the limit as $x \rightarrow 0$?

A. The limit is $-\infty$.

B. The limit is ∞ .

C. The limit is 0.

D. The limit does not exist.

E. Nothing can be said about the limit.

17. Find the horizontal and vertical asymptotes of $f(x)$. Then graph $f(x)$.

$$f(x) = \frac{4}{x-3}$$

If there is a horizontal asymptote, what is it? Select the correct choice below and fill in any answer boxes within your choice.

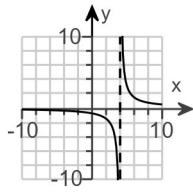
- A. The horizontal asymptote is . (Type an equation.)
- B. There is no horizontal asymptote.

If there is a vertical asymptote, what is it? Select the correct choice below and fill in any answer boxes within your choice.

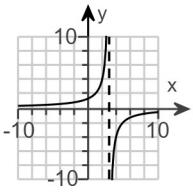
- A. The vertical asymptote is . (Type an equation.)
- B. There is no vertical asymptote.

Choose the correct graph of $f(x)$ below.

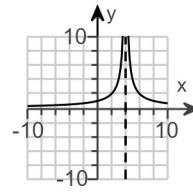
A.



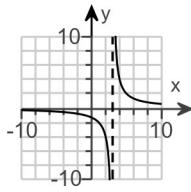
B.



C.



D.



18. Find the horizontal and vertical asymptotes of $f(x)$. Then graph $f(x)$.

$$f(x) = \frac{x+5}{x+3}$$

If there is a horizontal asymptote, what is it? Select the correct choice below and fill in any answer boxes within your choice.

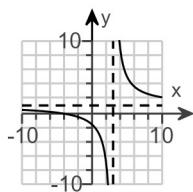
- A. The horizontal asymptote is . (Type an equation.)
- B. There is no horizontal asymptote.

If there is a vertical asymptote, what is it? Select the correct choice below and fill in any answer boxes within your choice.

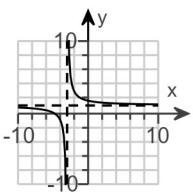
- A. The vertical asymptote is . (Type an equation.)
- B. There is no vertical asymptote.

Choose the correct graph of $f(x)$.

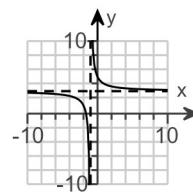
A.



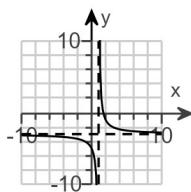
B.



C.



D.

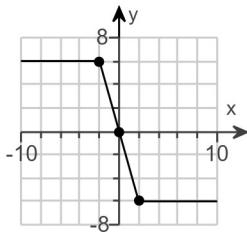


19. Sketch the graph of a function that satisfies the conditions given below.

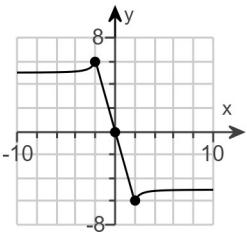
$$f(0) = 0, f(2) = 6, f(-2) = -6, \lim_{x \rightarrow -\infty} f(x) = -5, \text{ and } \lim_{x \rightarrow \infty} f(x) = 5$$

Choose the correct graph below.

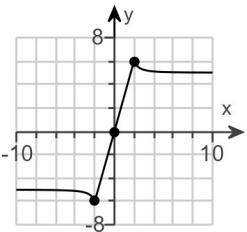
A.



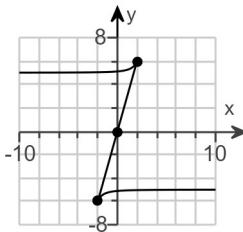
B.



C.



D.



20. Find a function that satisfies the given conditions and sketch its graph.

$$\lim_{x \rightarrow \pm\infty} f(x) = 1, \lim_{x \rightarrow 5^-} f(x) = \infty, \text{ and } \lim_{x \rightarrow 5^+} f(x) = \infty$$

Which of the following functions satisfies the given conditions?

A. $-\frac{1}{(x-5)^2} + 1$

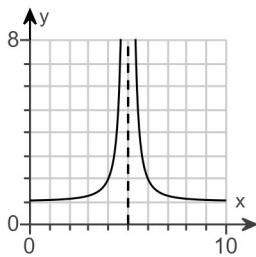
B. $\frac{1}{x-5} + 1$

C. $\ln(x-6)$

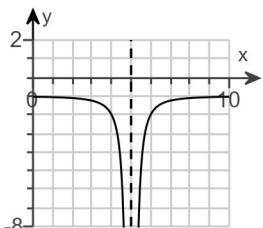
D. $\frac{1}{(x-5)^2} + 1$

Graph this function. Choose the correct graph below.

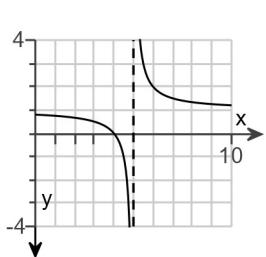
A.



B.



C.



D.

