

II. Limits

Find the limit, if it exists.

10. $\lim_{x \rightarrow 3} (x^2 + 2)$

11. $\lim_{x \rightarrow -3} \frac{(x+3)(x-4)}{(x+3)(x+1)}$

12. $\lim_{x \rightarrow 25} \frac{\sqrt{x} - 5}{x - 25}$

13. $\lim_{x \rightarrow -2} \frac{x-4}{x^2 - 2x - 8}$

14. $\lim_{x \rightarrow -3} \frac{x^2 + 2x - 3}{x^2 + 7x + 12}$

15. $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x + 2}$

16. $\lim_{x \rightarrow 5} \frac{x-5}{|x-5|}$

17. $\lim_{x \rightarrow 8} \frac{1}{x-8}$

Refer to the graph to find each limit:

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

(b) $\lim_{x \rightarrow 2^+} f(x)$

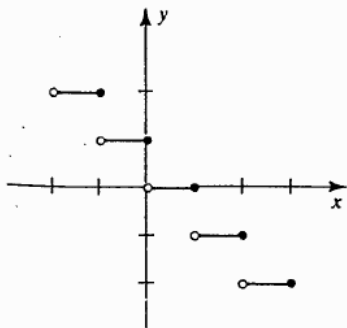
(c) $\lim_{x \rightarrow 2} f(x)$

(d) $\lim_{x \rightarrow 0^-} f(x)$

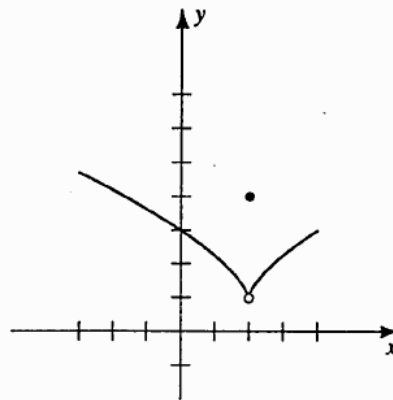
(e) $\lim_{x \rightarrow 0^+} f(x)$

(f) $\lim_{x \rightarrow 0} f(x)$

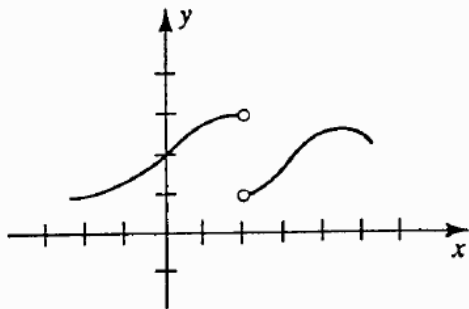
18.



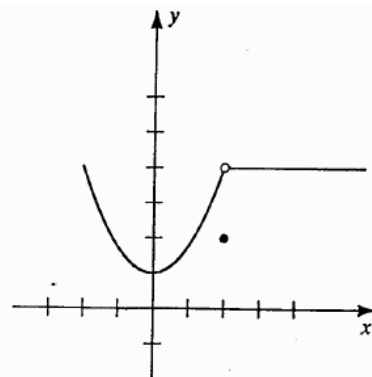
19.



20.



21.



Find each limit, if it exists.

$$22. f(x) = \begin{cases} x^2 - 1, & x < 1 \\ 4 - x, & x \geq 1 \end{cases}$$

(a) $\lim_{x \rightarrow 1^-} f(x)$

(b) $\lim_{x \rightarrow 1^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

$$23. f(x) = \begin{cases} 3x - 1, & x \leq 1 \\ 3 - x, & x > 1 \end{cases}$$

(a) $\lim_{x \rightarrow 1^-} f(x)$

(b) $\lim_{x \rightarrow 1^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

$$24. f(x) = \begin{cases} -x^2, & x < 1 \\ 2, & x = 1 \\ x - 2, & x > 1 \end{cases}$$

(a) $\lim_{x \rightarrow 1^-} f(x)$

(b) $\lim_{x \rightarrow 1^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

Find the limit, if it exists:

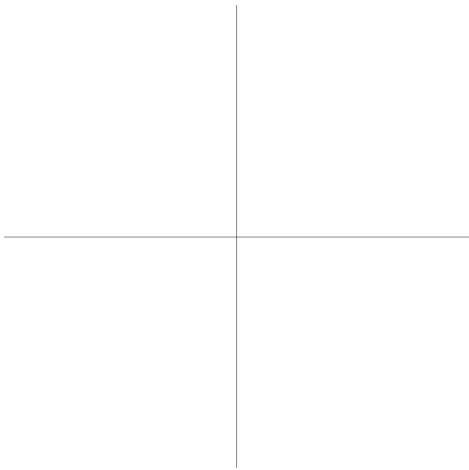
25. $\lim_{x \rightarrow \infty} \frac{5x^2 - 3x + 1}{2x^2 + 4x - 7}$

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

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

A function f satisfies the given conditions. Sketch a possible graph of f , assuming that f does not cross a horizontal asymptote.

28. $\lim_{x \rightarrow -\infty} f(x) = 1$, $\lim_{x \rightarrow \infty} f(x) = 1$, $\lim_{x \rightarrow 3^-} f(x) = -\infty$, $\lim_{x \rightarrow 3^+} f(x) = \infty$



29. $\lim_{x \rightarrow -\infty} f(x) = -2$, $\lim_{x \rightarrow \infty} f(x) = -2$, $\lim_{x \rightarrow 3^-} f(x) = \infty$, $\lim_{x \rightarrow 3^+} f(x) = -\infty$, $\lim_{x \rightarrow -1^-} f(x) = -\infty$ and $\lim_{x \rightarrow -1^+} f(x) = \infty$

