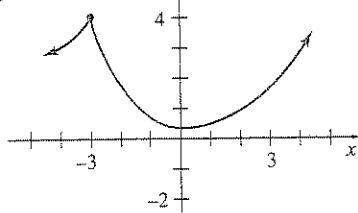


Calculus Review 3.1 & 3.2

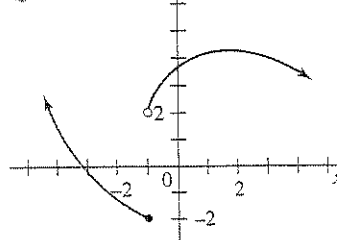
key

Decide whether the limits in Exercises 5–22 exist. If a limit exists, find its value.

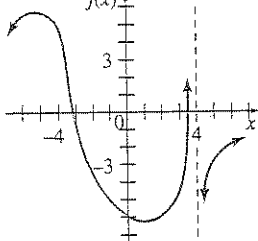
5. a. $\lim_{x \rightarrow -3} f(x)$ b. $\lim_{x \rightarrow 3} f(x)$ c. $\lim_{x \rightarrow -3} f(x)$ d. $f(-3)$



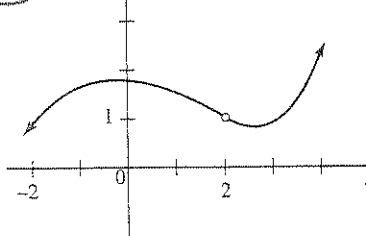
6. a. $\lim_{x \rightarrow -1} g(x)$ b. $\lim_{x \rightarrow -1} g(x)$ c. $\lim_{x \rightarrow -1} g(x)$ d. $g(-1)$



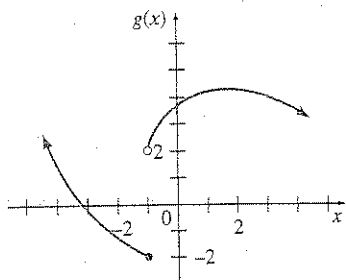
7. a. $\lim_{x \rightarrow -4} f(x)$ b. $\lim_{x \rightarrow 4} f(x)$ c. $\lim_{x \rightarrow 4} f(x)$ d. $f(4)$



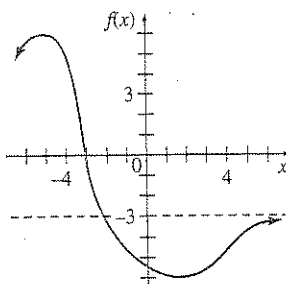
8. a. $\lim_{x \rightarrow 2} h(x)$ b. $\lim_{x \rightarrow 2} h(x)$ c. $\lim_{x \rightarrow 2} h(x)$ d. $h(2)$



9. $\lim_{x \rightarrow \infty} g(x) = \infty$



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



11. $\lim_{x \rightarrow 6} \frac{2x+7}{x+3} = \frac{19}{9}$

12. $\lim_{x \rightarrow -3} \frac{2x+5}{x+3} = \text{DNE}$

13. $\lim_{x \rightarrow 4} \frac{x^2-16}{x-4} = \frac{(x-4)(x+4)}{x-4} = 8$

14. $\lim_{x \rightarrow 2} \frac{x^2+3x-10}{x-2} = \frac{(x+5)(x-2)}{x-2} = 7$

15. $\lim_{x \rightarrow -4} \frac{2x^2+3x-20}{x+4} = \frac{(x+4)(2x-5)}{x+4} = -5$

16. $\lim_{x \rightarrow 3} \frac{3x^2-2x-21}{x-3} = 16$

17. $\lim_{x \rightarrow 9} \frac{\sqrt{x}-3}{x-9} = \frac{1}{6}$

18. $\lim_{x \rightarrow 16} \frac{\sqrt{x}-4}{x-16} = \frac{1}{8}$

19. $\lim_{x \rightarrow \infty} \frac{2x^2+5}{5x^2-1} = \frac{2}{5}$

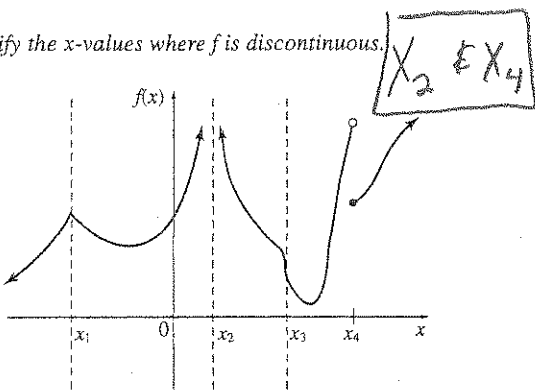
20. $\lim_{x \rightarrow \infty} \frac{x^2+6x+8}{x^3+2x+1} = 0$

21. $\lim_{x \rightarrow -\infty} \left(\frac{3}{8} + \frac{3}{x} - \frac{6}{x^2} \right) = \frac{3}{8}$

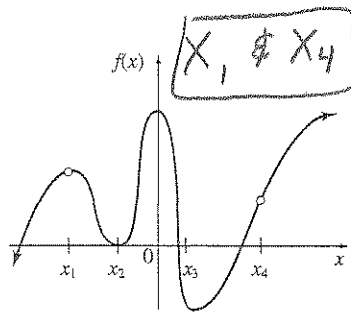
22. $\lim_{x \rightarrow -\infty} \left(\frac{9}{x^4} + \frac{10}{x^2} - 6 \right) = -6$

Identify the x-values where f is discontinuous.

23.



24.



Find all x-values where the function is discontinuous. For each such value, give $f(a)$ and $\lim_{x \rightarrow a} f(x)$, or state that it does not exist.

25. $f(x) = \frac{-5 + x}{3x(3x + 1)}$

26. $f(x) = \frac{7 - 3x}{(1 - x)(3 + x)}$

27. $f(x) = \frac{x - 6}{x + 5}$

28. $f(x) = \frac{x^2 - 9}{x + 3}$

29. $f(x) = x^2 + 3x - 4$

30. $f(x) = 2x^2 - 5x - 3$

In Exercises 31 and 32, (a) graph the given function, (b) find all values of x where the function is discontinuous, and (c) find the limit from the left and from the right at any values of x found in part b.

31. $f(x) = \begin{cases} 1 - x & \text{if } x < 1 \\ 2 & \text{if } 1 \leq x \leq 2 \\ 4 - x & \text{if } x > 2 \end{cases}$

32. $f(x) = \begin{cases} 2 & \text{if } x < 0 \\ -x^2 + x + 2 & \text{if } 0 \leq x \leq 2 \\ 1 & \text{if } x > 2 \end{cases}$

(25) $x=0$

$f(0) = \text{DNE}$

$\lim_{x \rightarrow 0} f(x) = \text{DNE}$

$x = -\frac{1}{3}$

$f(-\frac{1}{3}) = \text{DNE}$

$\lim_{x \rightarrow -\frac{1}{3}} f(x) = \text{DNE}$

(26) $x=1$

$f(1) = \text{DNE}$

$\lim_{x \rightarrow 1} f(x) = \text{DNE}$

$x = -3$

$f(-3) = \text{DNE}$

$\lim_{x \rightarrow -3} f(x) = \text{DNE}$

(27) $x = -5$

$f(-5) = \text{DNE}$

$\lim_{x \rightarrow -5} f(x) = \text{DNE}$

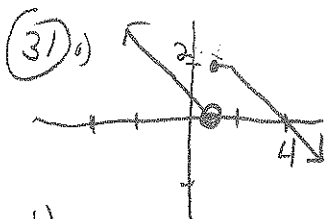
(28) $x = -3$

$f(-3) = \text{DNE}$

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

(29) No discontinuities

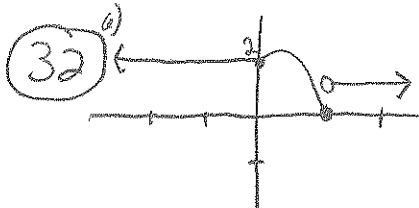
(30) No Discontinuities



b) $x=1$

c) $\lim_{x \rightarrow 1^-} f(x) = 0$

$\lim_{x \rightarrow 1^+} f(x) = 2$



b) $x=2$

c) $\lim_{x \rightarrow 2^-} f(x) = 0$

$\lim_{x \rightarrow 2^+} f(x) = 1$