

HW Chapter 1 Section 4 #8-18 evens, #30-48 evens

In Exercises 7–24, find the limit (if it exists). If it does not exist, explain why.

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

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

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

$$10. \lim_{x \rightarrow 4^-} \frac{\sqrt{x}-2}{x-4}$$

$$11. \lim_{x \rightarrow 0^-} \frac{|x|}{x}$$

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

$$13. \lim_{\Delta x \rightarrow 0^-} \frac{\frac{1}{x+\Delta x} - \frac{1}{x}}{\Delta x}$$

$$14. \lim_{\Delta x \rightarrow 0^+} \frac{(x+\Delta x)^2 + x + \Delta x - (x^2 + x)}{\Delta x}$$

$$15. \lim_{x \rightarrow 3^-} f(x), \text{ where } f(x) = \begin{cases} \frac{x+2}{2}, & x \leq 3 \\ \frac{12-2x}{3}, & x > 3 \end{cases}$$

$$16. \lim_{x \rightarrow 2} f(x), \text{ where } f(x) = \begin{cases} x^2 - 4x + 6, & x < 2 \\ -x^2 + 4x - 2, & x \geq 2 \end{cases}$$

$$17. \lim_{x \rightarrow 1} f(x), \text{ where } f(x) = \begin{cases} x^3 + 1, & x < 1 \\ x + 1, & x \geq 1 \end{cases}$$

$$18. \lim_{x \rightarrow 1^+} f(x), \text{ where } f(x) = \begin{cases} x, & x \leq 1 \\ 1-x, & x > 1 \end{cases}$$

In Exercises 29–32, discuss the continuity of the function on the closed interval.

$$29. g(x) = \sqrt{25-x^2}, \quad [-5, 5]$$

$$30. f(t) = 3 - \sqrt{9-t^2}, \quad [-3, 3]$$

$$31. f(x) = \begin{cases} 3-x, & x \leq 0 \\ 3 + \frac{1}{2}x, & x > 0 \end{cases}, \quad [-1, 4]$$

$$32. g(x) = \frac{1}{x^2-4}, \quad [-1, 2]$$

In Exercises 33–54, find the  $x$ -values (if any) at which  $f$  is not continuous. Which of the discontinuities are removable?

33.  $f(x) = x^2 - 2x + 1$

34.  $f(x) = \frac{1}{x^2 + 1}$

35.  $f(x) = 3x - \cos x$

36.  $f(x) = \cos \frac{\pi x}{2}$

37.  $f(x) = \frac{x}{x^2 - x}$

38.  $f(x) = \frac{x}{x^2 - 1}$

39.  $f(x) = \frac{x}{x^2 + 1}$

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

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

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

43.  $f(x) = \frac{|x + 2|}{x + 2}$

44.  $f(x) = \frac{|x - 3|}{x - 3}$

45.  $f(x) = \begin{cases} x, & x \leq 1 \\ x^2, & x > 1 \end{cases}$

46.  $f(x) = \begin{cases} -2x + 3, & x < 1 \\ x^2, & x \geq 1 \end{cases}$

47.  $f(x) = \begin{cases} \frac{1}{2}x + 1, & x \leq 2 \\ 3 - x, & x > 2 \end{cases}$

48.  $f(x) = \begin{cases} -2x, & x \leq 2 \\ x^2 - 4x + 1, & x > 2 \end{cases}$