

Section 1.2

Find the limits.

$$3. \lim_{x \rightarrow 2} x(x-1)(x+1)$$

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

$$7. \lim_{x \rightarrow 1^+} \frac{x^4 - 1}{x - 1}$$

$$9. \lim_{x \rightarrow -1} \frac{x^2 + 6x + 5}{x^2 - 3x - 4}$$

$$4. \lim_{x \rightarrow 3} x^3 - 3x^2 + 9x$$

$$6. \lim_{x \rightarrow 0} \frac{6x - 9}{x^3 - 12x + 3}$$

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

$$10. \lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6}$$

Section 1.3

9–32 Find the limits. ■

$$9. \lim_{x \rightarrow +\infty} (1 + 2x - 3x^5)$$

$$11. \lim_{x \rightarrow +\infty} \sqrt{x}$$

$$13. \lim_{x \rightarrow +\infty} \frac{3x + 1}{2x - 5}$$

$$15. \lim_{y \rightarrow -\infty} \frac{3}{y + 4}$$

$$17. \lim_{x \rightarrow -\infty} \frac{x - 2}{x^2 + 2x + 1}$$

$$19. \lim_{x \rightarrow +\infty} \frac{7 - 6x^5}{x + 3}$$

$$21. \lim_{t \rightarrow +\infty} \frac{6 - t^3}{7t^3 + 3}$$

$$10. \lim_{x \rightarrow +\infty} (2x^3 - 100x + 5)$$

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

$$14. \lim_{x \rightarrow +\infty} \frac{5x^2 - 4x}{2x^2 + 3}$$

$$16. \lim_{x \rightarrow +\infty} \frac{1}{x - 12}$$

$$18. \lim_{x \rightarrow +\infty} \frac{5x^2 + 7}{3x^2 - x}$$

$$20. \lim_{t \rightarrow -\infty} \frac{5 - 2t^3}{t^2 + 1}$$

$$22. \lim_{x \rightarrow -\infty} \frac{x + 4x^3}{1 - x^2 + 7x^3}$$

Section 1.5

11–22 Find values of x , if any, at which f is not continuous. ■

11. $f(x) = 5x^4 - 3x + 7$ 12. $f(x) = \sqrt[3]{x-8}$

13. $f(x) = \frac{x+2}{x^2+4}$

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

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

16. $f(x) = \frac{2x+1}{4x^2+4x+5}$

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

18. $f(x) = \frac{5}{x} + \frac{2x}{x+4}$

29–30 Find a value of the constant k , if possible, that will make the function continuous everywhere. ■

29. (a) $f(x) = \begin{cases} 7x-2, & x \leq 1 \\ kx^2, & x > 1 \end{cases}$

(b) $f(x) = \begin{cases} kx^2, & x \leq 2 \\ 2x+k, & x > 2 \end{cases}$

30. (a) $f(x) = \begin{cases} 9-x^2, & x \geq -3 \\ k/x^2, & x < -3 \end{cases}$

(b) $f(x) = \begin{cases} 9-x^2, & x \geq 0 \\ k/x^2, & x < 0 \end{cases}$

(optional)

Section 1.6

$$13. \lim_{\theta \rightarrow 0} \frac{\sin 3\theta}{\theta}$$

$$14. \lim_{h \rightarrow 0} \frac{\sin h}{2h}$$

$$15. \lim_{x \rightarrow 0} \frac{x^2 - 3 \sin x}{x}$$

$$20. \lim_{x \rightarrow 0} \frac{\sin 6x}{\sin 8x}$$

Chapter 2

Section 2.2

9–14 Use Definition 2.2.1 to find $f'(x)$, and then find the tangent line to the graph of $y = f(x)$ at $x = a$. ■

$$9. f(x) = 2x^2; a = 1$$

$$10. f(x) = 1/x^2; a = -1$$

$$11. f(x) = x^3; a = 0$$

$$12. f(x) = 2x^3 + 1; a = -1$$

Find the derivatives using the definition of derivative.

$$15. y = \frac{1}{x}$$

$$16. y = \frac{1}{x+1}$$

$$17. y = x^2 - x$$