

Find the limits in Exercises 19–36.

$$19. \lim_{x \rightarrow 5} \frac{x - 5}{x^2 - 25}$$

$$20. \lim_{x \rightarrow -3} \frac{x + 3}{x^2 + 4x + 3}$$

$$21. \lim_{x \rightarrow -5} \frac{x^2 + 3x - 10}{x + 5}$$

$$22. \lim_{x \rightarrow 2} \frac{x^2 - 7x + 10}{x - 2}$$

$$23. \lim_{t \rightarrow 1} \frac{t^2 + t - 2}{t^2 - 1}$$

$$24. \lim_{t \rightarrow -1} \frac{t^2 + 3t + 2}{t^2 - t - 2}$$

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

$$26. \lim_{y \rightarrow 0} \frac{5y^3 + 8y^2}{3y^4 - 16y^2}$$

$$27. \lim_{u \rightarrow 1} \frac{u^4 - 1}{u^3 - 1}$$

$$28. \lim_{v \rightarrow 2} \frac{v^3 - 8}{v^4 - 16}$$

$$29. \lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x - 9}$$

$$30. \lim_{x \rightarrow 4} \frac{4x - x^2}{2 - \sqrt{x}}$$

$$31. \lim_{x \rightarrow 1} \frac{x - 1}{\sqrt{x + 3} - 2}$$

$$32. \lim_{x \rightarrow -1} \frac{\sqrt{x^2 + 8} - 3}{x + 1}$$

$$33. \lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 12} - 4}{x - 2}$$

$$34. \lim_{x \rightarrow -2} \frac{x + 2}{\sqrt{x^2 + 5} - 3}$$

$$35. \lim_{x \rightarrow -3} \frac{2 - \sqrt{x^2 - 5}}{x + 3}$$

$$36. \lim_{x \rightarrow 4} \frac{4 - x}{5 - \sqrt{x^2 + 9}}$$

39. Suppose $\lim_{x \rightarrow c} f(x) = 5$ and $\lim_{x \rightarrow c} g(x) = -2$. Find

a. $\lim_{x \rightarrow c} f(x)g(x)$

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

c. $\lim_{x \rightarrow c} (f(x) + 3g(x))$

d. $\lim_{x \rightarrow c} \frac{f(x)}{f(x) - g(x)}$

40. Suppose $\lim_{x \rightarrow 4} f(x) = 0$ and $\lim_{x \rightarrow 4} g(x) = -3$. Find

a. $\lim_{x \rightarrow 4} (g(x) + 3)$

b. $\lim_{x \rightarrow 4} xf(x)$

c. $\lim_{x \rightarrow 4} (g(x))^2$

d. $\lim_{x \rightarrow 4} \frac{g(x)}{f(x) - 1}$

41. Suppose $\lim_{x \rightarrow b} f(x) = 7$ and $\lim_{x \rightarrow b} g(x) = -3$. Find

a. $\lim_{x \rightarrow b} (f(x) + g(x))$

b. $\lim_{x \rightarrow b} f(x) \cdot g(x)$

c. $\lim_{x \rightarrow b} 4g(x)$

d. $\lim_{x \rightarrow b} f(x)/g(x)$

42. Suppose that $\lim_{x \rightarrow -2} p(x) = 4$, $\lim_{x \rightarrow -2} r(x) = 0$, and $\lim_{x \rightarrow -2} s(x) = -3$. Find

a. $\lim_{x \rightarrow -2} (p(x) + r(x) + s(x))$

b. $\lim_{x \rightarrow -2} p(x) \cdot r(x) \cdot s(x)$

c. $\lim_{x \rightarrow -2} (-4p(x) + 5r(x))/s(x)$

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

43. $f(x) = x^2, \quad x = 1$

44. $f(x) = x^2, \quad x = -2$

45. $f(x) = 3x - 4, \quad x = 2$

46. $f(x) = 1/x, \quad x = -2$

47. $f(x) = \sqrt{x}, \quad x = 7$

48. $f(x) = \sqrt{3x+1}, \quad x = 0$

If $\lim_{x \rightarrow 4} \frac{f(x) - 5}{x - 2} = 1$, find $\lim_{x \rightarrow 4} f(x)$.

If $\lim_{x \rightarrow -2} \frac{f(x)}{x^2} = 1$, find a. $\lim_{x \rightarrow -2} f(x)$

b. $\lim_{x \rightarrow -2} \frac{f(x)}{x}$

a. If $\lim_{x \rightarrow 2} \frac{f(x) - 5}{x - 2} = 3$, find $\lim_{x \rightarrow 2} f(x)$.

b. If $\lim_{x \rightarrow 2} \frac{f(x) - 5}{x - 2} = 4$, find $\lim_{x \rightarrow 2} f(x)$.

Given that

$$1 - \frac{x^2}{4} \leq u(x) \leq 1 + \frac{x^2}{2} \quad \text{find } \lim_{x \rightarrow 0} u(x)$$

If $\sqrt{5 - 2x^2} \leq f(x) \leq \sqrt{5 - x^2}$ for $-1 \leq x \leq 1$, find $\lim_{x \rightarrow 0} f(x)$.

If $2 - x^2 \leq g(x) \leq 2 \cos x$ for all x , find $\lim_{x \rightarrow 0} g(x)$.

$$1 - \frac{x^2}{6} < \frac{x \sin x}{2 - 2 \cos x} < 1$$

$$\frac{1}{2} - \frac{x^2}{24} < \frac{1 - \cos x}{x^2} < \frac{1}{2}$$