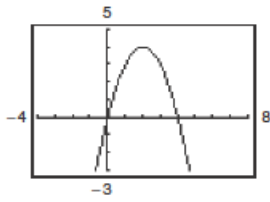


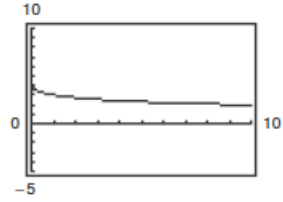
1.



(a) $\lim_{x \rightarrow 4} h(x) = 0$

(b) $\lim_{x \rightarrow -1} h(x) = -5$

2.

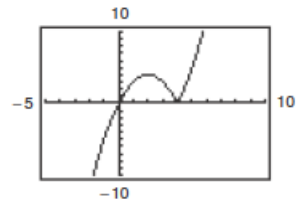


$$g(x) = \frac{12(\sqrt{x} - 3)}{x - 9}$$

(a) $\lim_{x \rightarrow 4} g(x) = 2.4$

(b) $\lim_{x \rightarrow 0} g(x) = 4$

3.

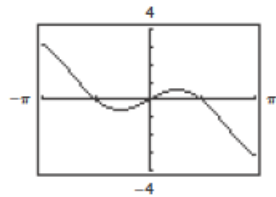


$$f(t) = t|t - 4|$$

(a) $\lim_{t \rightarrow 4} f(t) = 0$

(b) $\lim_{t \rightarrow -1} f(t) = -5$

4.



$$f(x) = x \cos x$$

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

(b) $\lim_{x \rightarrow \pi/3} f(x) \approx 0.524$

$$\left(= \frac{\pi}{6} \right)$$

$$5. \lim_{x \rightarrow 2} x^3 = 2^3 = 8$$

$$6. \lim_{x \rightarrow -2} x^4 = (-2)^4 = 16$$

$$7. \lim_{x \rightarrow -3} (3x + 2) = 3(-3) + 2 = -7$$

$$8. \lim_{x \rightarrow 0} (2x - 1) = 2(0) - 1 = -1$$

$$9. \lim_{x \rightarrow 1} (-x^2 + 1) = -(1)^2 + 1 = 0$$

$$10. \lim_{x \rightarrow -3} (x^2 + 3x) = (-3)^2 + 3(-3) = 9 - 9 = 0$$

$$11. \lim_{x \rightarrow 1} (3x^3 - 2x^2 + 4) = 3(1)^3 - 2(1)^2 + 4 = 5$$

$$12. \lim_{x \rightarrow -3} (2x^2 + 4x + 1) = 2(-3)^2 + 4(-3) + 1 \\ = 18 - 12 + 1 = 7$$

$$13. \lim_{x \rightarrow 3} \sqrt{x + 1} = \sqrt{3 + 1} = 2$$

$$14. \lim_{x \rightarrow 4} \sqrt[3]{x + 4} = \sqrt[3]{4 + 4} = 2$$

$$15. \lim_{x \rightarrow 0} (2x - 1)^3 = [2(0) - 1]^3 = -1$$

$$16. \lim_{x \rightarrow -4} (x + 3)^2 = (-4 + 3)^2 = 1$$

$$17. \lim_{x \rightarrow -3} \frac{2}{x + 2} = \frac{2}{-3 + 2} = -2$$

$$18. \lim_{x \rightarrow 2} \frac{1}{x} = \frac{1}{2}$$

$$19. \lim_{x \rightarrow 1} \frac{2x - 3}{x + 5} = \frac{2(1) - 3}{1 + 5} = \frac{-1}{6}$$

$$20. \lim_{x \rightarrow 1} \frac{x}{x^2 + 4} = \frac{1}{1^2 + 4} = \frac{1}{5}$$

$$21. \lim_{x \rightarrow 2} \frac{\sqrt{x + 2}}{x - 4} = \frac{\sqrt{2 + 2}}{2 - 4} = \frac{2}{-2} = -1$$

$$22. \lim_{x \rightarrow 7} \frac{3x}{\sqrt{x+2}} = \frac{3(7)}{\sqrt{7+2}} = \frac{21}{3} = 7$$

$$23. (a) \lim_{x \rightarrow -3} f(x) = (-3) + 7 = 4$$

$$(b) \lim_{x \rightarrow 4} g(x) = 4^2 = 16$$

$$(c) \lim_{x \rightarrow -3} g(f(x)) = g(4) = 16$$

$$24. (a) \lim_{x \rightarrow 1} f(x) = 5 - 1 = 4$$

$$(b) \lim_{x \rightarrow 4} g(x) = 4^3 = 64$$

$$(c) \lim_{x \rightarrow 1} g(f(x)) = g(f(1)) = g(4) = 64$$

$$25. (a) \lim_{x \rightarrow 1} f(x) = 4 - 1 = 3$$

$$(b) \lim_{x \rightarrow 3} g(x) = \sqrt{3+1} = 2$$

$$(c) \lim_{x \rightarrow 1} g(f(x)) = g(3) = 2$$

$$26. (a) \lim_{x \rightarrow 4} f(x) = 2(4^2) - 3(4) + 1 = 21$$

$$(b) \lim_{x \rightarrow 21} g(x) = \sqrt[3]{21+6} = 3$$

$$(c) \lim_{x \rightarrow 4} g(f(x)) = g(21) = 3$$

$$27. \lim_{x \rightarrow \pi/2} \sin x = \sin \frac{\pi}{2} = 1$$

$$28. \lim_{x \rightarrow \pi} \tan x = \tan \pi = 0$$

$$29. \lim_{x \rightarrow 2} \sin \frac{\pi x}{2} = \sin \frac{\pi(2)}{2} = 0$$

$$30. \lim_{x \rightarrow 1} \cos \frac{\pi x}{3} = \cos \frac{\pi}{3} = \frac{1}{2}$$

$$31. \lim_{x \rightarrow \pi} \cos 3x = \cos 3\pi = -1$$

$$32. \lim_{x \rightarrow 0} \sec 2x = \sec 0 = 1$$

$$33. \lim_{x \rightarrow 5\pi/3} \cos x = \cos \frac{5\pi}{3} = \frac{1}{2}$$

$$34. \lim_{x \rightarrow 5\pi/6} \sin x = \sin \frac{5\pi}{6} = \frac{1}{2}$$

$$35. \lim_{x \rightarrow 3} \tan\left(\frac{\pi x}{4}\right) = \tan \frac{3\pi}{4} = -1$$

$$36. \lim_{x \rightarrow 7} \sec\left(\frac{\pi x}{6}\right) = \sec \frac{7\pi}{6} = \frac{-2\sqrt{3}}{3}$$

$$37. (a) \lim_{x \rightarrow c} [5g(x)] = 5 \lim_{x \rightarrow c} g(x) = 5(2) = 10$$

$$(b) \lim_{x \rightarrow c} [f(x) + g(x)] = \lim_{x \rightarrow c} f(x) + \lim_{x \rightarrow c} g(x) = 3 + 2 = 5$$

$$(c) \lim_{x \rightarrow c} [f(x)g(x)] = \left[\lim_{x \rightarrow c} f(x)\right] \left[\lim_{x \rightarrow c} g(x)\right] = (3)(2) = 6$$

$$(d) \lim_{x \rightarrow c} \frac{f(x)}{g(x)} = \frac{\lim_{x \rightarrow c} f(x)}{\lim_{x \rightarrow c} g(x)} = \frac{3}{2}$$

$$38. (a) \lim_{x \rightarrow c} [4f(x)] = 4 \lim_{x \rightarrow c} f(x) = 4\left(\frac{3}{2}\right) = 6$$

$$(b) \lim_{x \rightarrow c} [f(x) + g(x)] = \lim_{x \rightarrow c} f(x) + \lim_{x \rightarrow c} g(x) = \frac{3}{2} + \frac{1}{2} = 2$$

$$(c) \lim_{x \rightarrow c} [f(x)g(x)] = \left[\lim_{x \rightarrow c} f(x)\right] \left[\lim_{x \rightarrow c} g(x)\right] = \left(\frac{3}{2}\right)\left(\frac{1}{2}\right) = \frac{3}{4}$$

$$(d) \lim_{x \rightarrow c} \frac{f(x)}{g(x)} = \frac{\lim_{x \rightarrow c} f(x)}{\lim_{x \rightarrow c} g(x)} = \frac{3/2}{1/2} = 3$$

$$39. (a) \lim_{x \rightarrow c} [f(x)]^3 = \left[\lim_{x \rightarrow c} f(x)\right]^3 = (4)^3 = 64$$

$$(b) \lim_{x \rightarrow c} \sqrt{f(x)} = \sqrt{\lim_{x \rightarrow c} f(x)} = \sqrt{4} = 2$$

$$(c) \lim_{x \rightarrow c} [3f(x)] = 3 \lim_{x \rightarrow c} f(x) = 3(4) = 12$$

$$(d) \lim_{x \rightarrow c} [f(x)]^{3/2} = \left[\lim_{x \rightarrow c} f(x)\right]^{3/2} = (4)^{3/2} = 8$$

$$40. (a) \lim_{x \rightarrow c} \sqrt[3]{f(x)} = \sqrt[3]{\lim_{x \rightarrow c} f(x)} = \sqrt[3]{27} = 3$$

$$(b) \lim_{x \rightarrow c} \frac{f(x)}{18} = \frac{\lim_{x \rightarrow c} f(x)}{\lim_{x \rightarrow c} 18} = \frac{27}{18} = \frac{3}{2}$$

$$(c) \lim_{x \rightarrow c} [f(x)]^2 = \left[\lim_{x \rightarrow c} f(x)\right]^2 = (27)^2 = 729$$

$$(d) \lim_{x \rightarrow c} [f(x)]^{2/3} = \left[\lim_{x \rightarrow c} f(x)\right]^{2/3} = (27)^{2/3} = 9$$

41. $f(x) = x - 1$ and $g(x) = \frac{x^2 - x}{x}$ agree except at
 $x = 0$.

(a) $\lim_{x \rightarrow 0} g(x) = \lim_{x \rightarrow 0} f(x) = 0 - 1 = -1$

(b) $\lim_{x \rightarrow -1} g(x) = \lim_{x \rightarrow -1} f(x) = -1 - 1 = -2$

42. $f(x) = -x + 3$ and $h(x) = \frac{-x^2 + 3x}{x}$ agree except at
 $x = 0$.

(a) $\lim_{x \rightarrow 2} h(x) = \lim_{x \rightarrow 2} f(x) = -2 + 3 = 1$

(b) $\lim_{x \rightarrow 0} h(x) = \lim_{x \rightarrow 0} f(x) = -0 + 3 = 3$

43. $f(x) = x(x + 1)$ and $g(x) = \frac{x^3 - x}{x - 1}$ agree except at
 $x = 1$.

(a) $\lim_{x \rightarrow 1} g(x) = \lim_{x \rightarrow 1} f(x) = 2$

(b) $\lim_{x \rightarrow -1} g(x) = \lim_{x \rightarrow -1} f(x) = 0$

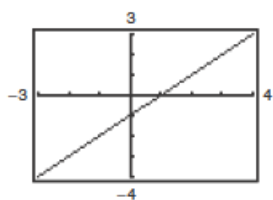
44. $g(x) = \frac{1}{x - 1}$ and $f(x) = \frac{x}{x^2 - x}$ agree except at
 $x = 0$.

(a) $\lim_{x \rightarrow 1} f(x)$ does not exist.

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

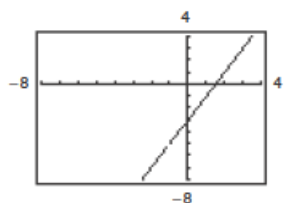
45. $f(x) = \frac{x^2 - 1}{x + 1}$ and $g(x) = x - 1$ agree except at
 $x = -1$.

$$\lim_{x \rightarrow -1} f(x) = \lim_{x \rightarrow -1} g(x) = -2$$



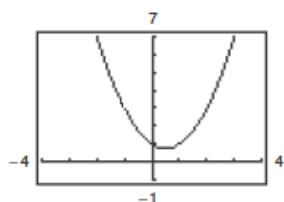
46. $f(x) = \frac{2x^2 - x - 3}{x + 1}$ and $g(x) = 2x - 3$ agree except at $x = -1$.

$$\lim_{x \rightarrow -1} f(x) = \lim_{x \rightarrow -1} g(x) = -5$$



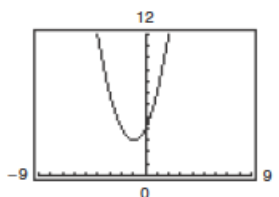
47. $f(x) = \frac{x^3 + 1}{x + 1}$ and $g(x) = x^2 - x + 1$ agree except at $x = -1$.

$$\lim_{x \rightarrow -1} f(x) = \lim_{x \rightarrow -1} g(x) = 3$$



48. $f(x) = \frac{x^3 - 8}{x - 2}$ and $g(x) = x^2 + 2x + 4$ agree except at $x = 2$.

$$\lim_{x \rightarrow 2} f(x) = \lim_{x \rightarrow 2} g(x) = 12$$



$$49. \lim_{x \rightarrow 0} \frac{x}{x^2 - x} = \lim_{x \rightarrow 0} \frac{x}{x(x - 1)} = \lim_{x \rightarrow 0} \frac{1}{x - 1} = -1$$

$$50. \lim_{x \rightarrow 0} \frac{3x}{x^2 + 2x} = \lim_{x \rightarrow 0} \frac{3x}{x(x + 2)} = \lim_{x \rightarrow 0} \frac{3}{x + 2} = \frac{3}{2}$$