Section 1.5 (page 88)

1. $\lim_{x\to 4^+} \dfrac{1}{x-4} = \infty$, $\lim_{x\to 4^-} \dfrac{1}{x-4} = -\infty$

3. $\lim_{x\to 4^+} \dfrac{1}{(x-4)^2} = \infty$, $\lim_{x\to 4^-} \dfrac{1}{(x-4)^2} = \infty$

5. $\lim_{x\to -2^+} 2\left|\dfrac{x}{x^2-4}\right| = \infty$, $\lim_{x\to -2^-} 2\left|\dfrac{x}{x^2-4}\right| = \infty$

7. $\lim_{x\to -2^+} \tan(\pi x/4) = -\infty$, $\lim_{x\to -2^-} \tan(\pi x/4) = \infty$

9.

x	-3.5	-3.1	-3.01	-3.001
$f(x)$	0.31	1.64	16.6	167

x	-2.999	-2.99	-2.9	-2.5
$f(x)$	-167	-16.7	-1.69	-0.36

$\lim_{x\to -3^+} f(x) = -\infty$ $\lim_{x\to -3^-} f(x) = \infty$

11.

x	-3.5	-3.1	-3.01	-3.001
$f(x)$	3.8	16	151	1501

x	-2.999	-2.99	-2.9	-2.5
$f(x)$	-1499	-149	-14	-2.3

$\lim_{x\to -3^+} f(x) = -\infty$ $\lim_{x\to -3^-} f(x) = \infty$

13. $x = 0$ **15.** $x = \pm 2$ **17.** No vertical asymptote

19. $x = 2$, $x = -1$ **21.** $t = 0$ **23.** $x = -2, x = 1$

25. No vertical asymptote **27.** No vertical asymptote

29. $x = \frac{1}{2} + n$, n is an integer.

31. $t = n\pi$, n is a nonzero integer.

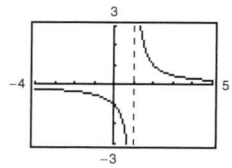
33. Removable discontinuity at $x = -1$

35. Vertical asymptote at $x = -1$ **37.** ∞ **39.** ∞

41. ∞ **43.** $-\frac{1}{5}$ **45.** $\frac{1}{2}$ **47.** $-\infty$ **49.** ∞ **51.** 0

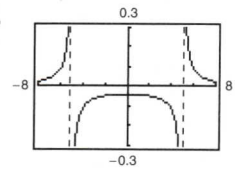
53. Limit does not exist.

55.



$\lim_{x\to 1^+} f(x) = \infty$

57.

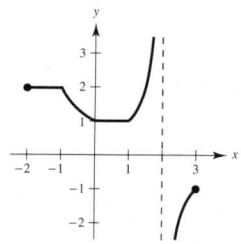


$\lim_{x\to 5^-} f(x) = -\infty$

59. Answers will vary.

61. Answers will vary. Example: $f(x) = \dfrac{x-3}{x^2-4x-12}$

63.



65. ∞

67. (a) $\frac{1}{3}(200\pi)$ ft/sec

(b) 200π ft/sec

(c) $\lim_{\theta\to(\pi/2)^-} [50\pi \sec^2\theta] = \infty$

69. (a) Domain: $x > 25$

(b)

x	30	40	50	60
y	150	66.667	50	42.857

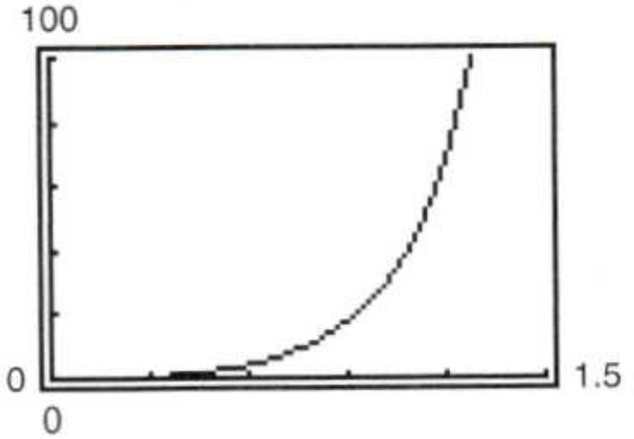
(c) $\lim_{x\to 25^+} \dfrac{25x}{x-25} = \infty$

As x gets closer and closer to 25 mi/h, y becomes larger and larger.

71. (a) $A = 50 \tan \theta - 50\theta$; Domain: $(0, \pi/2)$

(b)

θ	0.3	0.6	0.9	1.2	1.5
$f(\theta)$	0.47	4.21	18.0	68.6	630.1



(c) $\lim_{\theta \to \pi/2^-} A = \infty$

73. False; let $f(x) = (x^2 - 1)/(x - 1)$

75. False; let $f(x) = \tan x$

77. Let $f(x) = \dfrac{1}{x^2}$ and $g(x) = \dfrac{1}{x^4}$, and let $c = 0$. $\lim_{x \to 0} \dfrac{1}{x^2} = \infty$ and $\lim_{x \to 0} \dfrac{1}{x^4} = \infty$, but $\lim_{x \to 0} \left(\dfrac{1}{x^2} - \dfrac{1}{x^4} \right) = \lim_{x \to 0} \left(\dfrac{x^2 - 1}{x^4} \right) = -\infty \neq 0$.

79. Given $\lim_{x \to c} f(x) = \infty$, let $g(x) = 1$. Then $\lim_{x \to c} \dfrac{g(x)}{f(x)} = 0$ by Theorem 1.15.

81. Answers will vary.