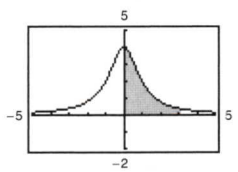
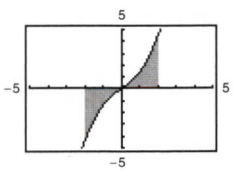
Section 4.4 (page 293)

1.



Positive

3.



Zero

5. 12 **7.** -2 **9.** $-\frac{10}{3}$ **11.** $\frac{1}{3}$ **13.** $\frac{1}{2}$ **15.** $\frac{2}{3}$ **17.** -4

19. $-\frac{1}{18}$ **21.** $-\frac{27}{20}$ **23.** $\frac{25}{2}$ **25.** $\frac{64}{3}$ **27.** $\pi + 2$

29. $\pi/4$ **31.** $2\sqrt{3}/3$ **33.** 0 **35.** $\frac{1}{6}$ **37.** 1 **39.** $\frac{52}{3}$

41. 20 **43.** $\frac{32}{3}$ **45.** $3\sqrt[3]{2}/2 \approx 1.8899$

47. $\frac{1444}{225} \approx 6.4178$ **49.** $\pm\arccos \sqrt{\pi}/2 \approx \pm 0.4817$

51. Average value $= 6$
$x = \pm\sqrt{3} \approx \pm 1.7321$

53. Average value $= \frac{1}{4}$
$x = \sqrt[3]{2}/2 \approx 0.6300$

55. Average value $= 2/\pi$
$x \approx 0.690, x \approx 2.451$

57. About 540 ft

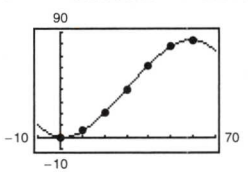
59. (a) 8 (b) $\frac{4}{3}$ (c) $\int_1^7 f(x)\,dx = 20$; Average value $= \frac{10}{3}$

61. (a) $F(x) = 500 \sec^2 x$ (b) $1500\sqrt{3}/\pi \approx 827$ N

63. About 0.5318 L

65. (a) $v = -0.00086t^3 + 0.0782t^2 - 0.208t + 0.10$

(b)



(c) 2475.6 m

67. $F(x) = 2x^2 - 7x$
$F(2) = -6$
$F(5) = 15$
$F(8) = 72$

69. $F(x) = -20/x + 20$
$F(2) = 10$
$F(5) = 16$
$F(8) = \frac{35}{2}$

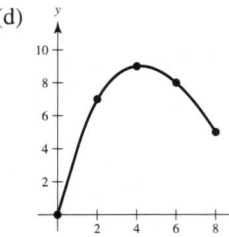
71. $F(x) = \sin x - \sin 1$
$F(2) = \sin 2 - \sin 1 \approx 0.0678$
$F(5) = \sin 5 - \sin 1 \approx -1.8004$
$F(8) = \sin 8 - \sin 1 \approx 0.1479$

73. (a) $g(0) = 0, g(2) \approx 7, g(4) \approx 9, g(6) \approx 8, g(8) \approx 5$

(b) Increasing: (0, 4); Decreasing: (4, 8)

(c) A maximum occurs at $x = 4$.

(d)

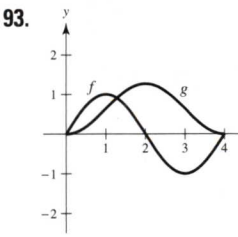


75. $\frac{1}{2}x^2 + 2x$ **77.** $\frac{3}{4}x^{4/3} - 12$ **79.** $\tan x - 1$

81. $x^2 - 2x$ **83.** $\sqrt{x^4 + 1}$ **85.** $x \cos x$ **87.** 8

89. $\cos x\sqrt{\sin x}$ **91.** $3x^2 \sin x^6$

93.



An extremum of g occurs at $x = 2$.

95. (a) $C(x) = 1000(12x^{5/4} + 125)$

(b) $C(1) = \$137{,}000$
$C(5) \approx \$214{,}721$
$C(10) \approx \$338{,}394$

97. (a) $\frac{3}{2}$ ft to the right (b) $\frac{113}{10}$ ft **99.** (a) 0 ft (b) $\frac{63}{2}$ ft

101. (a) 2 ft to the right (b) 2 ft **103.** 28 units **105.** 8190 L

107. $f(x) = x^{-2}$ has a nonremovable discontinuity at $x = 0$.

109. $f(x) = \sec^2 x$ has a nonremovable discontinuity at $x = \pi/2$.

111. $2/\pi \approx 63.7\%$ **113.** True

115. $f'(x) = \dfrac{1}{(1/x)^2 + 1}\left(-\dfrac{1}{x^2}\right) + \dfrac{1}{x^2 + 1} = 0$

Because $f'(x) = 0$, $f(x)$ is constant.

117. (a) 0 (b) 0 (c) $xf(x) + \int_0^x f(t)\,dt$ (d) 0