66.–70. Answers will vary. **72.** True

74. False. $\ln(\cos x)$ must always be positive while $\cos(\ln x)$ may be positive, zero, or negative.

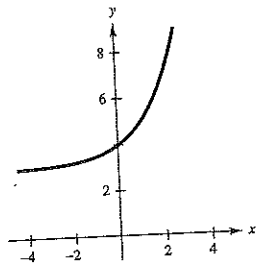
76. $\sqrt{\tan^2 x} = |\tan x|$; $\frac{3\pi}{4}$ **78.** $|\tan\theta| = \sqrt{\sec^2\theta - 1}$; $\frac{3\pi}{4}$

80. Answers will vary.

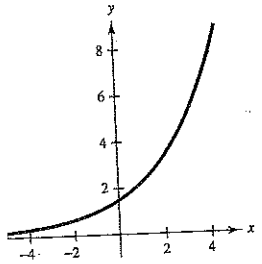
82. Answer is not unique. Sample answer:
$y = x^3 - x^2 + 64x - 64$

84. Answer is not unique. Sample answer:
$y = x^3 - 16x^2 + 85x - 148$

86.



88.



90. $\theta \approx 1.286$ rad **92.** Quadrant II **94.** Quadrant IV

Section 5.3 *(page 400)*

2.–6. Answers will vary. **8.** $x = -\frac{1}{4}, \frac{3}{4}, \frac{7}{4}, \frac{11}{4}$

10. $x = \pm 2$ **12.** $\frac{5\pi}{4}, \frac{7\pi}{4}$ **14.** $\frac{3\pi}{4}, \frac{7\pi}{4}$

16. $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

18. $\frac{\pi}{9}, \frac{2\pi}{9}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{7\pi}{9}, \frac{8\pi}{9}, \frac{10\pi}{9}, \frac{11\pi}{9}, \frac{13\pi}{9}, \frac{14\pi}{9}, \frac{16\pi}{9}, \frac{17\pi}{9}$

20. $0, \frac{\pi}{2}, \frac{3\pi}{2}$ **22.** $0, \frac{\pi}{4}, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{5\pi}{4}, \frac{4\pi}{3}, \frac{5\pi}{3}$

24. $\frac{\pi}{4}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{4\pi}{3}, \frac{7\pi}{4}$ **26.** $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

28. $\frac{\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{3\pi}{2}$ **30.** $\frac{\pi}{3}, \frac{5\pi}{3}$ **32.** $\frac{2\pi}{3}, \frac{5\pi}{6}, \frac{5\pi}{3}, \frac{11\pi}{6}$

34. $\frac{\pi}{12}, \frac{5\pi}{12}, \frac{3\pi}{4}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{7\pi}{4}$

36. $\frac{\pi}{12}, \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$

38. $\frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$ **40.** $\frac{\pi}{3}, \frac{5\pi}{3}$

42. $0.3218, \frac{\pi}{4}, 3.4633, \frac{5\pi}{4}$ **44.** 3.8930, 6.0217

46. 0.2527, 2.8889, 4.7124 **48.** 1.0472, 5.2360

50. 1.1071, 4.2487 **52.** 1.1142, 2.7726

54. 0.5153, 2.7259, 3.6569, 5.8675

56. 0.5880, 2.0344, 3.7296, 5.1760 **58.** 1.998

60. $-1.035, 0.870$

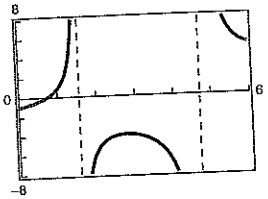
62. (a)

x	0	1	2	3
$f(x)$	-1	0.85	-5.81	-4.03

x	4	5	6
$f(x)$	-7.12	16.63	5.25

Any zeros are in the intervals $(0, 1)$, $(1, 2)$, and $(4, 5)$ because f changes signs in those intervals.

(b)



The only interval is $(0, 1)$. The result differs from that in part (a) because of the vertical asymptotes.

(c) 0.7391

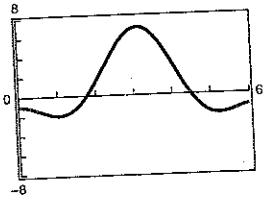
64. (a)

x	0	1	2	3
$f(x)$	-1	-1.99	1.36	6.88

x	4	5	6
$f(x)$	3.32	-1.81	-1.15

The zeros are in the intervals $(1, 2)$ and $(4, 5)$ because f changes signs in those intervals.

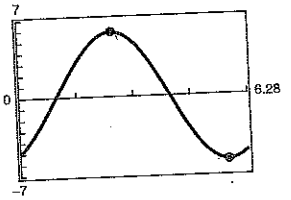
(b)



The intervals are the same as in part (a).

(c) 1.7794, 4.5038

66. (a)

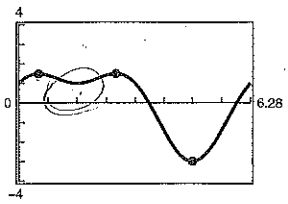


Maximum: (2.6012, 5.8310)

Minimum: (5.7428, -5.8310)

(b) 2.6012, 5.7428

68. (a)



Maxima: (0.5236, 1.5); (2.6180, 1.5)

Minimum: (4.7124, −3)

(b) 0.5236, 1.5708, 2.6180, 4.7124

70. 0.739

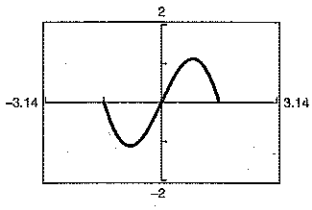
72. (a) All real numbers except $x = 0$

(b) y-axis symmetry; horizontal asymptote at $y = 0$

(c) y approaches 1 (d) $\pm\pi, \pm 2\pi$

74. February, March, April **76.** 37°, 53°

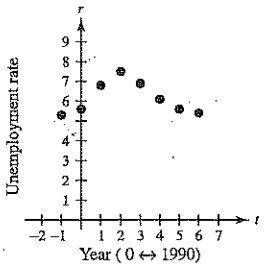
78. (a)



$x \approx 0.86, A \approx 1.12$

(b) $0.6 < x < 1.1$

80. (a)



(b) iii

(c) Constant term; 6.34%

(d) Approximately 6 years

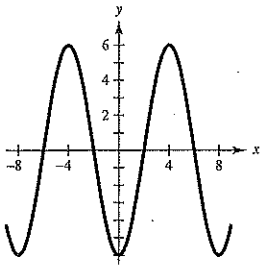
(e) 2001

82. False. Reasons will vary. **84.** Answers will vary.

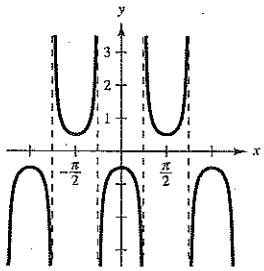
86. 8.482 rad **88.** −3.675 rad

90. 14 **92.** 9.4

94.



96.



Section 5.4 *(page 408)*

2. (a) $\frac{-\sqrt{6}-\sqrt{2}}{4}$ (b) $\frac{\sqrt{3}+\sqrt{2}}{2}$

4. (a) $\frac{-\sqrt{6}-\sqrt{2}}{4}$ (b) $\frac{-\sqrt{2}-\sqrt{3}}{2}$

6. (a) $-\frac{1}{2}$ (b) $-\frac{3}{2}$ **8.** (a) $\frac{1}{2}$ (b) $\frac{1+\sqrt{3}}{2}$

10. $\sin(15°) = \frac{\sqrt{6}-\sqrt{2}}{4}$

$\cos(15°) = \frac{\sqrt{6}+\sqrt{2}}{4}$

$\tan(15°) = 2 - \sqrt{3}$

12. $\sin(165°) = \frac{\sqrt{6}-\sqrt{2}}{4}$

$\cos(165°) = \frac{-\sqrt{6}-\sqrt{2}}{4}$

$\tan(165°) = -2 + \sqrt{3}$

14. $\sin(285°) = \frac{-\sqrt{2}-\sqrt{6}}{4}$

$\cos(285°) = \frac{\sqrt{6}-\sqrt{2}}{4}$

$\tan(285°) = -2 - \sqrt{3}$

16. $\sin\left(\frac{17\pi}{12}\right) = \frac{-\sqrt{2}-\sqrt{6}}{4}$

$\cos\left(\frac{17\pi}{12}\right) = \frac{\sqrt{2}-\sqrt{6}}{4}$

$\tan\left(\frac{17\pi}{12}\right) = 2 + \sqrt{3}$

18. $\sin\left(-\frac{19\pi}{12}\right) = \frac{\sqrt{6}+\sqrt{2}}{4}$

$\cos\left(-\frac{19\pi}{12}\right) = \frac{\sqrt{6}-\sqrt{2}}{4}$

$\tan\left(-\frac{19\pi}{12}\right) = 2 + \sqrt{3}$

20. sin 190° **22.** cos 10° **24.** tan 80°

26. cos 0.54 **28.** $\sin\frac{29\pi}{90}$

30.

x	0.2	0.4	0.6	0.8
y_1	0.0395	0.1516	0.3188	0.5146
y_2	0.0395	0.1516	0.3188	0.5146

x	1.0	1.2	1.4
y_1	0.7081	0.8687	0.9711
y_2	0.7081	0.8687	0.9711