

APPENDIX D

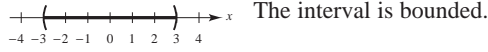
Section D.1 (page D8)

1. Rational 3. Irrational 5. Rational 7. Rational

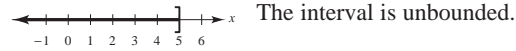
9. Rational 11. $\frac{4}{11}$ 13. $\frac{11}{37}$

15. (a) True (b) False (c) True (d) False
 (e) False (f) False

17. x is greater than -3 and less than 3 .



19. x is no more than 5 .

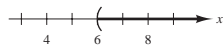


21. $y \geq 4, [4, \infty)$ 23. $0.03 < r \leq 0.07, (0.03, 0.07]$

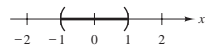
25. $x \geq \frac{1}{2}$ 27. $-\frac{1}{2} < x < \frac{7}{2}$



29. $x > 6$



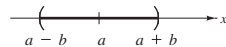
31. $-1 < x < 1$



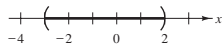
33. $x \geq 13, x \leq -7$



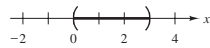
35. $a - b < x < a + b$



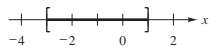
37. $-3 < x < 2$



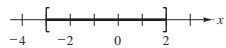
39. $0 < x < 3$



41. $-3 \leq x \leq 1$



43. $-3 \leq x \leq 2$



45. $4, -4, 4$ 47. (a) $-51, 51, 51$ (b) $51, -51, 51$

49. 1 51. (a) 14 (b) 10 53. $|x| \leq 2$

55. $|x - 2| > 2$ 57. (a) $|x - 12| \leq 10$ (b) $|x - 12| \geq 10$

59. $x \geq 36$ units 61. $x \leq 41$ or $x \geq 59$

63. (a) $\frac{355}{112} > \pi$ (b) $\frac{22}{7} > \pi$ 65. b

67. False: the reciprocal of 2 is $\frac{1}{2}$, which is not an integer.

68. True 69. True 70. False: $|0| = 0$. 71. True

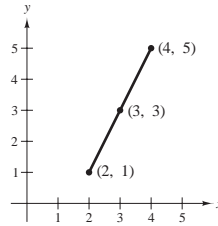
72. True 73. Proof 75. Proof 77. Proof

79. Proof

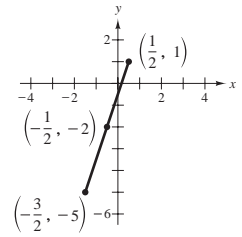
81. $|-3 - 1| > |-3| - |1|$
 $|3 - 1| = |3| - |1|$

Section D.2 (page D15)

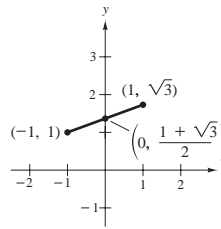
1. $d = 2\sqrt{5}$



3. $d = 2\sqrt{10}$



5. $8\sqrt{8 - 2\sqrt{3}}$

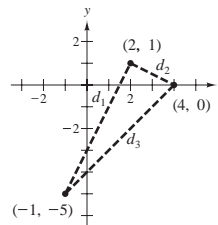


7. Right triangle:

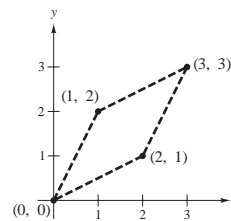
$$d_1 = \sqrt{45}, d_2 = \sqrt{5}$$

$$d_3 = \sqrt{50}$$

$$(d_1)^2 + (d_2)^2 = (d_3)^2$$

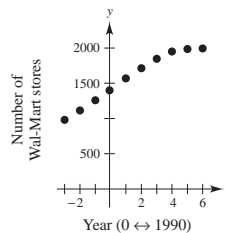


9. Rhombus: the length of each side is $\sqrt{5}$.



11. Quadrant II 13. Quadrants I and III

15. $x = 0 \leftrightarrow 1990$



17. $d_1 = 2\sqrt{5}, d_2 = \sqrt{5}, d_3 = 3\sqrt{5}$

Collinear, because $d_1 + d_2 = d_3$

19. $d_1 = \sqrt{2}, d_2 = \sqrt{13}, d_3 = 5$

Not collinear, because $d_1 + d_2 > d_3$

21. $x = \pm 3$ 23. $y = \pm \sqrt{55}$

25. $\left(\frac{3x_1 + x_2}{4}, \frac{3y_1 + y_2}{4}\right)$ $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
 $\left(\frac{x_1 + 3x_2}{4}, \frac{y_1 + 3y_2}{4}\right)$

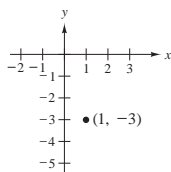
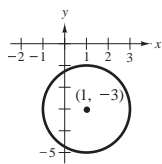
27. c 28. b 29. a 30. d 31. $x^2 + y^2 - 9 = 0$

33. $x^2 + y^2 - 4x + 2y - 11 = 0$

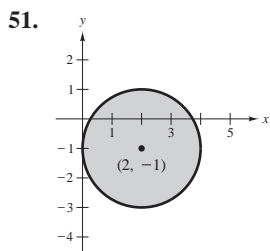
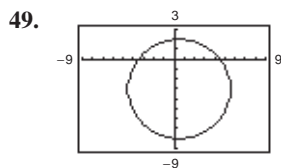
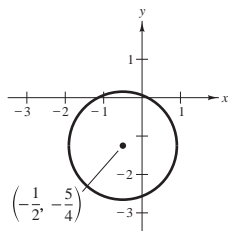
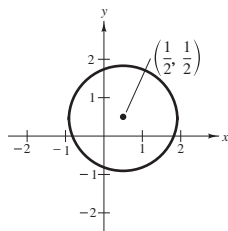
35. $x^2 + y^2 + 2x - 4y = 0$

37. $x^2 + y^2 - 6x - 4y + 3 = 0$ 39. $x^2 + y^2 = 26,000^2$

41. $(x - 1)^2 + (y + 3)^2 = 4$ 43. $(x - 1)^2 + (y + 3)^2 = 0$



45. $(x - \frac{1}{2})^2 + (y - \frac{1}{2})^2 = 2$ 47. $(x + \frac{1}{2})^2 + (y + \frac{5}{4})^2 = \frac{9}{4}$



53. Proof 55. True 56. False: the distance is $|2b|$.

57. True 58. True 59. Proof 61. Proof

Section D.3 (page D25)

1. (a) $396^\circ, -324^\circ$ (b) $240^\circ, -480^\circ$

3. (a) $\frac{19\pi}{9}, -\frac{17\pi}{9}$ (b) $\frac{10\pi}{3}, -\frac{2\pi}{3}$

5. (a) $\frac{\pi}{6}, 0.524$ (b) $\frac{5\pi}{6}, 2.618$

(c) $\frac{7\pi}{4}, 5.498$ (d) $\frac{2\pi}{3}, 2.094$

7. (a) 270° (b) 210° (c) -105° (d) -135.6°

9.

r	8 ft	15 in.	85 cm	24 in.	$\frac{12,963}{\pi}$ mi
s	12 ft	24 in.	63.75π cm	96 in.	8642 mi
θ	1.5	1.6	$\frac{3\pi}{4}$	4	$\frac{2\pi}{3}$

11. (a) $\sin \theta = \frac{4}{5}$ $\csc \theta = \frac{5}{4}$ (b) $\sin \theta = -\frac{5}{13}$ $\csc \theta = -\frac{13}{5}$
 $\cos \theta = \frac{3}{5}$ $\sec \theta = \frac{5}{3}$ $\cos \theta = -\frac{12}{13}$ $\sec \theta = -\frac{13}{12}$
 $\tan \theta = \frac{4}{3}$ $\cot \theta = \frac{3}{4}$ $\tan \theta = \frac{5}{12}$ $\cot \theta = \frac{12}{5}$

13. (a) Quadrant III (b) Quadrant IV

15. $\frac{\sqrt{3}}{2}$ 17. $\frac{4}{3}$

19. (a) $\sin 60^\circ = \frac{\sqrt{3}}{2}$ (b) $\sin 120^\circ = \frac{\sqrt{3}}{2}$

$\cos 60^\circ = \frac{1}{2}$ $\cos 120^\circ = -\frac{1}{2}$

$\tan 60^\circ = \sqrt{3}$ $\tan 120^\circ = -\sqrt{3}$

(c) $\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$ (d) $\sin \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$

$\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$ $\cos \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$

$\tan \frac{\pi}{4} = 1$ $\tan \frac{5\pi}{4} = 1$

21. (a) $\sin 225^\circ = -\frac{\sqrt{2}}{2}$ (b) $\sin(-225^\circ) = \frac{\sqrt{2}}{2}$

$\cos 225^\circ = -\frac{\sqrt{2}}{2}$ $\cos(-225^\circ) = -\frac{\sqrt{2}}{2}$

$\tan 225^\circ = 1$ $\tan(-225^\circ) = -1$

(c) $\sin \frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$ (d) $\sin \frac{11\pi}{6} = -\frac{1}{2}$

$\cos \frac{5\pi}{3} = \frac{1}{2}$ $\cos \frac{11\pi}{6} = \frac{\sqrt{3}}{2}$

$\tan \frac{5\pi}{3} = -\sqrt{3}$ $\tan \frac{11\pi}{6} = -\frac{\sqrt{3}}{3}$

23. (a) 0.1736 (b) 5.759 25. (a) 0.3640 (b) 0.3640

27. (a) $\theta = \frac{\pi}{4}, \frac{7\pi}{4}$ (b) $\theta = \frac{3\pi}{4}, \frac{5\pi}{4}$

29. (a) $\theta = \frac{\pi}{4}, \frac{5\pi}{4}$ (b) $\theta = \frac{5\pi}{6}, \frac{11\pi}{6}$

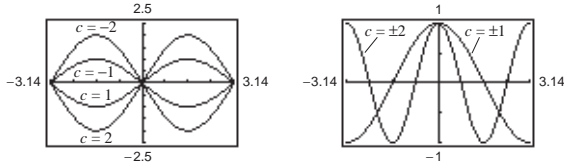
31. $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ 33. $\theta = 0, \frac{\pi}{4}, \pi, \frac{5\pi}{4}$

35. $\theta = \frac{\pi}{3}, \frac{5\pi}{3}$ 37. $\theta = 0, \frac{\pi}{2}, \pi$ 39. 5099 feet

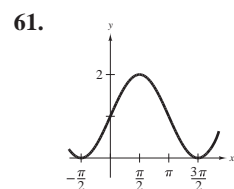
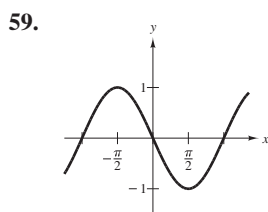
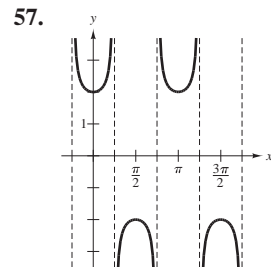
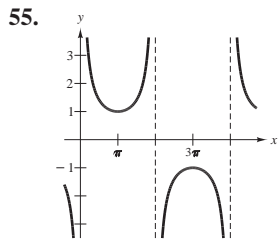
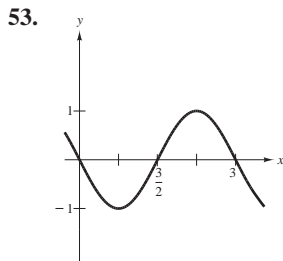
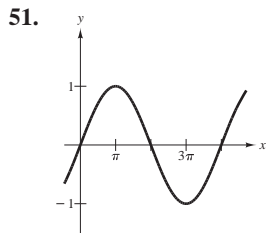
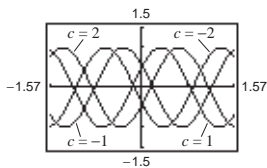
41. (a) Period: π (b) Period: 2 43. Period: $\frac{1}{2}$
 Amplitude: 2 Amplitude: $\frac{1}{2}$ Amplitude: 3

45. Period: $\frac{\pi}{2}$ 47. Period: $\frac{2\pi}{5}$

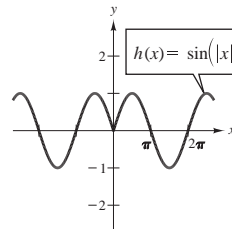
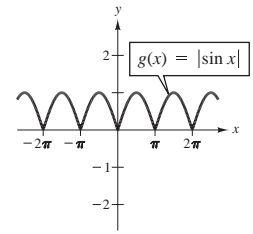
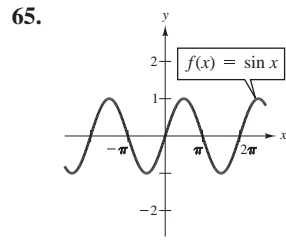
49. (a) Change in amplitude (b) Change in period



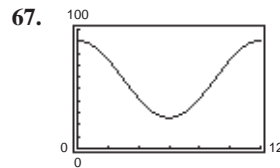
- (c) Horizontal translation



63. $a = 3, b = \frac{1}{2}, c = \frac{\pi}{2}$

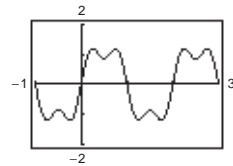


The graph of $|f(x)|$ will reflect any parts of the graph of $f(x)$ below the x -axis about the x -axis. The graph of $f(|x|)$ will reflect the part of the graph of $f(x)$ left of the y -axis about the y -axis.



January, November, December

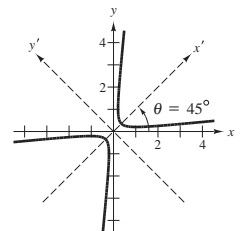
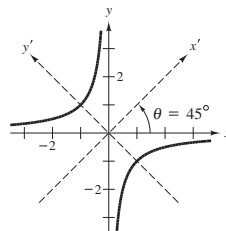
69. $f(x) = \frac{4}{\pi} \left(\sin \pi x + \frac{1}{3} \sin 3\pi x + \frac{1}{5} \sin 5\pi x + \dots \right)$



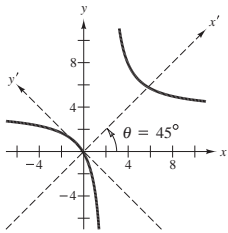
APPENDIX E (page E6)

1. $\frac{(y')^2}{2} - \frac{(x')^2}{2} = 1$

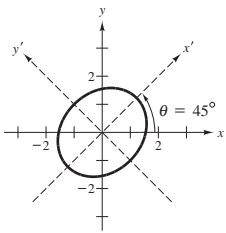
3. $\frac{(x')^2}{1/4} - \frac{(y')^2}{1/6} = 1$



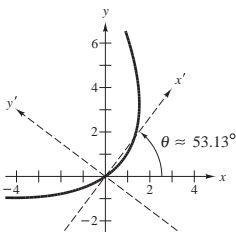
5. $\frac{(x' - 3\sqrt{2})^2}{16} - \frac{(y' - \sqrt{2})^2}{16} = 1$



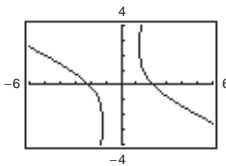
7. $\frac{(x')^2}{3} + \frac{(y')^2}{2} = 1$



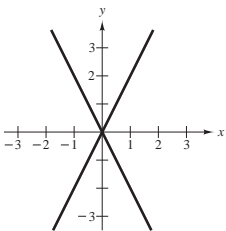
11. $y' = \frac{(x')^2}{6} - \frac{x'}{3}$



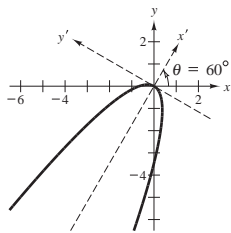
15. $\theta \approx 26.57^\circ$



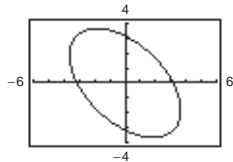
19. Parabola 21. Ellipse



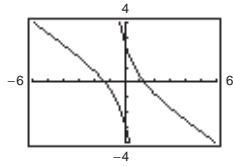
9. $x' = -(y')^2$



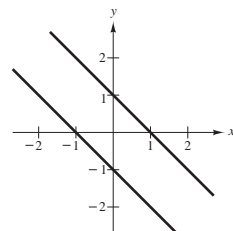
13. $\theta = 45^\circ$



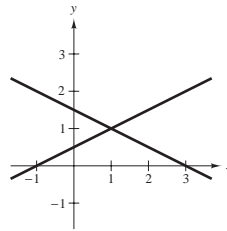
17. $\theta \approx 31.72^\circ$



23. Hyperbola 25. Parabola
27. Two lines 29. Two parallel lines



31. Two lines

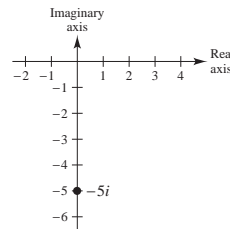


33. Proof

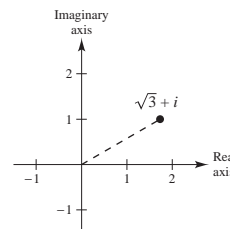
APPENDIX F (page F10)

1. $11 - i$ 3. 4 5. $3 - 3\sqrt{2}i$ 7. $-14 + 20i$
 9. $\frac{1}{6} + \frac{7}{6}i$ 11. $-2\sqrt{3}$ 13. -10 15. $5 + i$
 17. $12 + 30i$ 19. 24 21. $-9 + 40i$ 23. -10
 25. 34 27. 9 29. 400 31. 8 33. $-6i$
 35. $\frac{16}{41} + \frac{20}{41}i$ 37. $\frac{3}{5} + \frac{4}{5}i$ 39. $-7 - 6i$
 41. $-\frac{9}{1681} + \frac{40}{1681}i$ 43. $-\frac{1}{2} - \frac{5}{2}i$ 45. $\frac{62}{949} + \frac{297}{949}i$
 47. $1 \pm i$ 49. $-2 \pm \frac{1}{2}i$ 51. $-\frac{5}{2}, -\frac{3}{2}$ 53. $\frac{1}{8} \pm \frac{\sqrt{11}}{8}i$
 55. $-1 + 6i$ 57. $-5i$ 59. $-375\sqrt{3}i$ 61. i
 63. 5 65. $4\sqrt{2}$

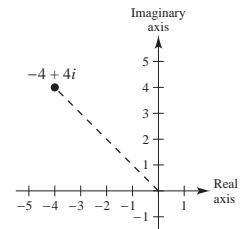
67. $\sqrt{85}$



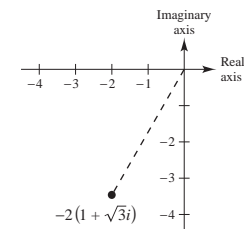
71. $2\left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}\right)$



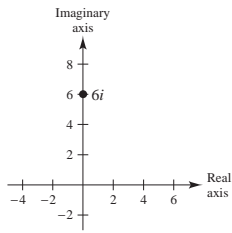
69. $3\sqrt{2}\left(\cos \frac{7\pi}{4} + i \sin \frac{7\pi}{4}\right)$



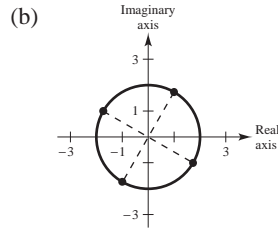
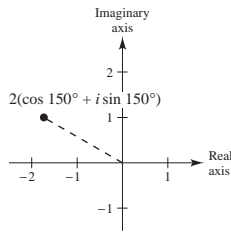
73. $4\left(\cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3}\right)$



75. $6\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$

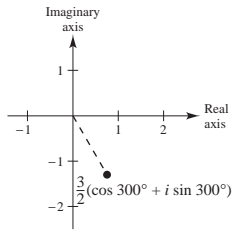


77. $-\sqrt{3} + i$

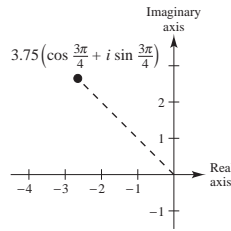


(c) $1 + \sqrt{3}i, -\sqrt{3} + i, -1 - \sqrt{3}i, \sqrt{3} - i$

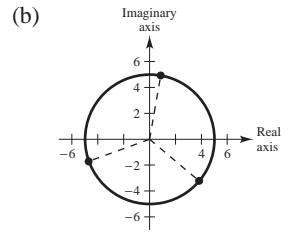
79. $\frac{3}{4} - \frac{3\sqrt{3}}{4}i$



81. $\frac{-15\sqrt{2}}{8} + \frac{15\sqrt{2}}{8}i$



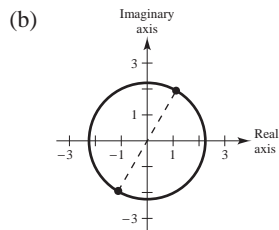
99. (a) $5\left(\cos \frac{4\pi}{9} + i \sin \frac{4\pi}{9}\right)$
 $5\left(\cos \frac{10\pi}{9} + i \sin \frac{10\pi}{9}\right)$
 $5\left(\cos \frac{16\pi}{9} + i \sin \frac{16\pi}{9}\right)$



83. $12\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$ 85. $\frac{10}{9}(\cos 200^\circ + i \sin 200^\circ)$

87. $-4 - 4i$ 89. $-32i$ 91. $-128\sqrt{3} - 128i$ 93. i

95. (a) $\sqrt{5}(\cos 60^\circ + i \sin 60^\circ)$
 $\sqrt{5}(\cos 240^\circ + i \sin 240^\circ)$



(c) $\frac{\sqrt{5}}{2} + \frac{\sqrt{15}}{2}i, -\frac{\sqrt{5}}{2} - \frac{\sqrt{15}}{2}i$

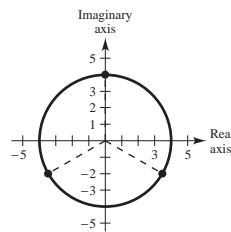
97. (a) $2\left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}\right)$

$2\left(\cos \frac{5\pi}{6} + i \sin \frac{5\pi}{6}\right)$

$2\left(\cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3}\right)$

$2\left(\cos \frac{11\pi}{6} + i \sin \frac{11\pi}{6}\right)$

105. $4\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$
 $4\left(\cos \frac{7\pi}{6} + i \sin \frac{7\pi}{6}\right)$
 $4\left(\cos \frac{11\pi}{6} + i \sin \frac{11\pi}{6}\right)$



107. $\sqrt[6]{2}(\cos 105^\circ + i \sin 105^\circ)$
 $\sqrt[6]{2}(\cos 225^\circ + i \sin 225^\circ)$
 $\sqrt[6]{2}(\cos 345^\circ + i \sin 345^\circ)$

