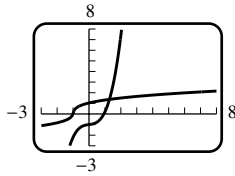
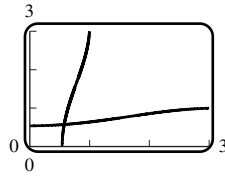


A46 Answers to Odd-Numbered Exercises

31.



33.



35. (a) $x = 4 \cos t$, $y = 3 \sin t$ (b) $x = -1 + 4 \cos t$, $y = 2 + 3 \sin t$

Appendix B (Page B1)

1. (a) $\frac{5}{12}\pi$ (b) $\frac{13}{6}\pi$ (c) $\frac{1}{9}\pi$ (d) $\frac{23}{30}\pi$
 3. (a) 12° (b) $(270/\pi)^\circ$ (c) 288° (d) 540°
 5.

| | $\sin \theta$ | $\cos \theta$ | $\tan \theta$ | $\csc \theta$ | $\sec \theta$ | $\cot \theta$ |
|-----|---------------|---------------|---------------|---------------|---------------|---------------|
| (a) | $\sqrt{21}/5$ | $2/5$ | $\sqrt{21}/2$ | $5/\sqrt{21}$ | $5/2$ | $2/\sqrt{21}$ |
| (b) | $3/4$ | $\sqrt{7}/4$ | $3/\sqrt{7}$ | $4/3$ | $4/\sqrt{7}$ | $\sqrt{7}/3$ |
| (c) | $3/\sqrt{10}$ | $1/\sqrt{10}$ | 3 | $\sqrt{10}/3$ | $\sqrt{10}$ | $1/3$ |

 7. $\sin \theta = 3/\sqrt{10}$, $\cos \theta = 1/\sqrt{10}$ 9. $\tan \theta = \sqrt{21}/2$, $\csc \theta = 5/\sqrt{21}$
 11. 1.8

| | θ | $\sin \theta$ | $\cos \theta$ | $\tan \theta$ | $\csc \theta$ | $\sec \theta$ | $\cot \theta$ |
|-----|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
| (a) | 225° | $-1/\sqrt{2}$ | $-1/\sqrt{2}$ | 1 | $-\sqrt{2}$ | $-\sqrt{2}$ | 1 |
| (b) | -210° | $1/2$ | $-\sqrt{3}/2$ | $-1/\sqrt{3}$ | 2 | $-2/\sqrt{3}$ | $-\sqrt{3}$ |
| (c) | $5\pi/3$ | $-\sqrt{3}/2$ | $1/2$ | $-\sqrt{3}$ | $-2/\sqrt{3}$ | 2 | $-1/\sqrt{3}$ |
| (d) | $-3\pi/2$ | 1 | 0 | — | 1 | — | 0 |

| | $\sin \theta$ | $\cos \theta$ | $\tan \theta$ | $\csc \theta$ | $\sec \theta$ | $\cot \theta$ |
|-----|---------------|---------------|---------------|---------------|---------------|---------------|
| (a) | $4/5$ | $3/5$ | $4/3$ | $5/4$ | $5/3$ | $3/4$ |
| (b) | $-4/5$ | $3/5$ | $-4/3$ | $-5/4$ | $5/3$ | $-3/4$ |
| (c) | $1/2$ | $-\sqrt{3}/2$ | $-1/\sqrt{3}$ | 2 | $-2/\sqrt{3}$ | $-\sqrt{3}$ |
| (d) | $-1/2$ | $\sqrt{3}/2$ | $-1/\sqrt{3}$ | -2 | $2/\sqrt{3}$ | $-\sqrt{3}$ |
| (e) | $1/\sqrt{2}$ | $1/\sqrt{2}$ | 1 | $\sqrt{2}$ | $\sqrt{2}$ | 1 |
| (f) | $1/\sqrt{2}$ | $-1/\sqrt{2}$ | -1 | $\sqrt{2}$ | $-\sqrt{2}$ | -1 |

17. (a) 1.2679 (b) 3.5753

19.

| | $\sin \theta$ | $\cos \theta$ | $\tan \theta$ | $\csc \theta$ | $\sec \theta$ | $\cot \theta$ |
|-----|-------------------|-------------------|------------------|-------------------|-------------------|------------------|
| (a) | $a/3$ | $\sqrt{9-a^2}/3$ | $a/\sqrt{9-a^2}$ | $3/a$ | $3/\sqrt{9-a^2}$ | $\sqrt{9-a^2}/a$ |
| (b) | $a/\sqrt{a^2+25}$ | $5/\sqrt{a^2+25}$ | $a/5$ | $\sqrt{a^2+25}/a$ | $\sqrt{a^2+25}/5$ | $5/a$ |
| (c) | $\sqrt{a^2-1}/a$ | $1/a$ | $\sqrt{a^2-1}$ | $a/\sqrt{a^2-1}$ | a | $1/\sqrt{a^2-1}$ |

21. (a) $3\pi/4 \pm n\pi$, $n = 0, 1, 2, \dots$
 (b) $\pi/3 \pm 2n\pi$ and $5\pi/3 \pm 2n\pi$, $n = 0, 1, 2, \dots$
 23. (a) $\pi/6 \pm n\pi$, $n = 0, 1, 2, \dots$
 (b) $4\pi/3 \pm 2n\pi$ and $5\pi/3 \pm 2n\pi$, $n = 0, 1, 2, \dots$
 25. (a) $3\pi/4 \pm n\pi$, $n = 0, 1, 2, \dots$
 (b) $\pi/6 \pm n\pi$, $n = 0, 1, 2, \dots$
 27. (a) $\pi/3 \pm 2n\pi$ and $2\pi/3 \pm 2n\pi$, $n = 0, 1, 2, \dots$
 (b) $\pi/6 \pm 2n\pi$ and $11\pi/6 \pm 2n\pi$, $n = 0, 1, 2, \dots$
 29. $\sin \theta = 2/5$, $\cos \theta = -\sqrt{21}/5$, $\tan \theta = -2/\sqrt{21}$,
 $\csc \theta = 5/2$, $\sec \theta = -5/\sqrt{21}$, $\cot \theta = -\sqrt{21}/2$
 31. (a) $\theta = \pm n\pi$, $n = 0, 1, 2, \dots$ (b) $\theta = \pi/2 \pm n\pi$, $n = 0, 1, 2, \dots$
 (c) $\theta = \pm n\pi$, $n = 0, 1, 2, \dots$ (d) $\theta = \pm n\pi$, $n = 0, 1, 2, \dots$
 (e) $\theta = \pi/2 \pm n\pi$, $n = 0, 1, 2, \dots$ (f) $\theta = \pm n\pi$, $n = 0, 1, 2, \dots$
 33. (a) $2\pi/3$ cm (b) $10\pi/3$ cm 35. $\frac{2}{5}$
 37. (a) $\frac{2\pi - \theta}{2\pi}R$ (b) $\frac{\sqrt{4\pi\theta - \theta^2}}{2\pi}R$ 39. $\frac{21}{4}\sqrt{3}$ 41. 9.2 ft
 43. $h = d(\tan \beta - \tan \alpha)$ 45. (a) $4\sqrt{5}/9$ (b) $-\frac{1}{9}$
 47. $\sin 3\theta = 3 \sin \theta \cos^2 \theta - \sin^3 \theta$, $\cos 3\theta = \cos^3 \theta - 3 \sin^2 \theta \cos \theta$

61. (a) $\cos \theta$ (b) $-\sin \theta$ (c) $-\cos \theta$ (d) $\sin \theta$
 69. (a) 153° (b) 45° (c) 117° (d) 89° 71. (a) 60° (b) 117°

Appendix C (Page C1)

1. (a) $q(x) = x^2 + 4x + 2$, $r(x) = -11x + 6$
 (b) $q(x) = 2x^2 + 4$, $r(x) = 9$
 (c) $q(x) = x^3 - x^2 + 2x - 2$, $r(x) = 2x + 1$
 3. (a) $q(x) = 3x^2 + 6x + 8$, $r(x) = 15$
 (b) $q(x) = x^3 - 5x^2 + 20x - 100$, $r(x) = 504$
 (c) $q(x) = x^4 + x^3 + x^2 + x + 1$, $r(x) = 0$
 5.

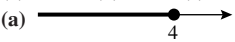
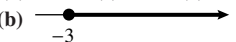
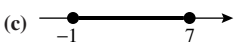



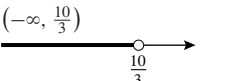
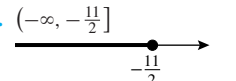
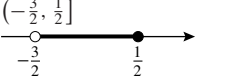
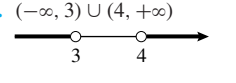
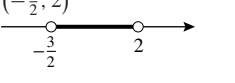
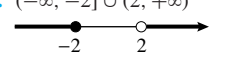
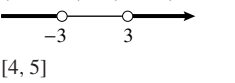
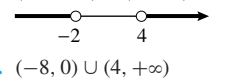
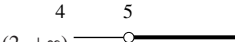
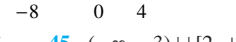
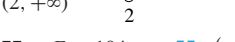
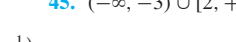
| x | 0 | 1 | -3 | 7 |
|--------|----|----|-----|------|
| $p(x)$ | -4 | -3 | 101 | 5001 |

 7. (a) $q(x) = x^2 + 6x + 13$, $r = 20$ (b) $q(x) = x^2 + 3x - 2$, $r = -4$
 9. (a) ± 1 , ± 2 , ± 3 , ± 4 , ± 6 , ± 8 , ± 12 , ± 24
 (b) ± 1 , ± 2 , ± 5 , ± 10 , $\pm \frac{1}{3}$, $\pm \frac{2}{3}$, $\pm \frac{5}{3}$, $\pm \frac{10}{3}$ (c) ± 1 , ± 17
 11. $(x+1)(x-1)(x-2)$ 13. $(x+3)^3(x+1)$
 15. $(x+3)(x+2)(x+1)^2(x-3)$ 17. -3 19. -2 , $-\frac{2}{3}$, $-1 \pm \sqrt{3}$
 21. -2, 2, 3 23. 2, 5 25. 7 cm

Appendix E (Page E1)

1. (a) rational (b) integer, rational (c) integer, rational (d) rational
 (e) integer, rational (f) irrational (g) rational
 (h) integer, rational 3. (a) $\frac{41}{333}$ (b) $\frac{115}{9}$ (c) $\frac{20943}{550}$ (d) $\frac{537}{1250}$
 5. (a) $\frac{256}{81}$ (b) worse
 7.

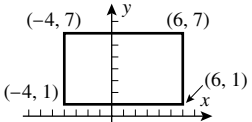
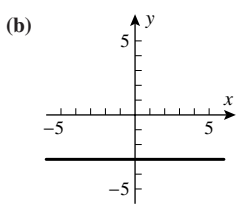
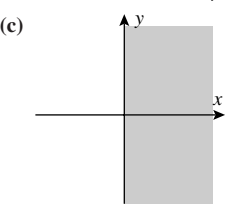
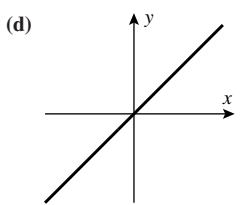
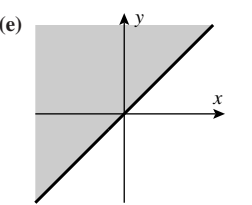
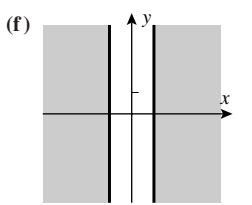
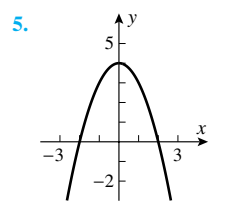
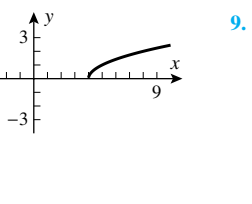
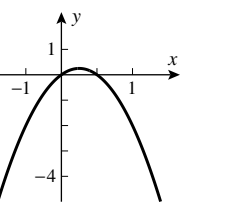
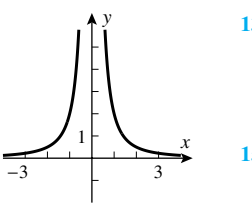
| Line | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|------|------|------|---------|------|------|
| Blocks | 3, 4 | 1, 2 | 3, 4 | 2, 4, 5 | 1, 2 | 3, 4 |

 9. (a), (d), (f) 11. (a) all values (b) none 13. (a) yes (b) no
 15. (a) $\{x : x \text{ is a positive odd integer}\}$ (b) $\{x : x \text{ is an even integer}\}$
 (c) $\{x : x \text{ is irrational}\}$ (d) $\{x : x \text{ is an integer and } 7 \leq x \leq 10\}$
 17. (a) false (b) true (c) true (d) false (e) true (f) true (g) true
 19. (a)  (b) 
 (c)  (d) 
 (e)  (f) 
 21. (a) $[-2, 2]$ (b) $(-\infty, -2) \cup (2, +\infty)$
 23.  25. 
 27.  29. 
 31.  33. 
 35.  37. 
 39.  41. 
 43.  45. 
 47. $77 \leq F \leq 104$ 55. $(-\infty, -\frac{1}{2})$

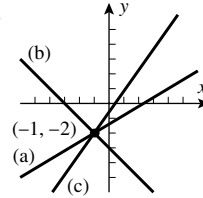
Exercise Set F (Page F1)

1. (a) 7 (b) $\sqrt{2}$ (c) k^2 (d) k^2 3. $x \leq 3$ 5. all real x
 7. $x \geq 0$ or $x = -\frac{2}{3}$ 9. $x \geq -5$
 13. (a) 2 (b) 1 (c) 14 (d) $3 + \sqrt{2}$ (e) 7 (f) 5
 15. (a) -9 (b) 7 (c) 12
 17. $-\frac{5}{6}, \frac{3}{2}$ 19. $\frac{1}{2}, \frac{5}{2}$ 21. $-\frac{11}{10}, \frac{11}{8}$ 23. $1, \frac{17}{5}$
 25. $(-9, -3)$ 27. $[-\frac{3}{2}, \frac{9}{2}]$ 29. $(-\infty, -3) \cup (-1, +\infty)$
 31. $(-\infty, \frac{1}{2}] \cup [\frac{9}{2}, +\infty)$ 33. $(-\infty, \frac{1}{2}) \cup (\frac{3}{2}, +\infty)$
 35. $[\frac{1}{8}, \frac{1}{2}] \cup (\frac{1}{2}, \frac{7}{8}]$ 37. $x \in (-\infty, 2] \cup [3, +\infty)$ 39. -3, 9

Appendix G (Page G1)

1. $(-4, 7)$ 3. (a) 
- (b) 
- (c) 
- (d) 
- (e) 
- (f) 
5. 
7. 
9. 
11. 
13. (a) $\frac{1}{2}$ (b) -1 (c) 0 (d) not defined
 15. (a) yes (b) no

17.



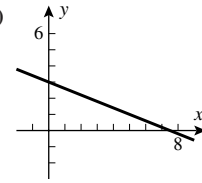
19. III < II < IV < I

 21. (a) 14 (b) $-\frac{1}{3}$

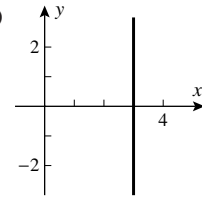
23. 29

 25. $\frac{13}{7}$

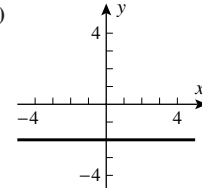
29. (a)



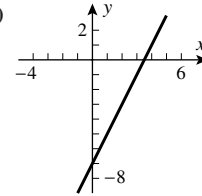
(b)



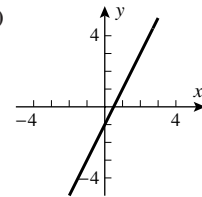
(c)



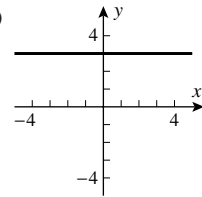
(d)



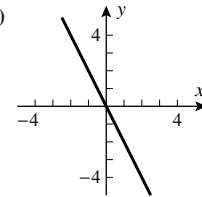
31. (a)



(b)



(c)



33.

| | (a) | (b) | (c) | (d) | (e) |
|-------------|-----|------|------|-----|------|
| Slope | 3 | -1/4 | -3/5 | 0 | -b/a |
| y-intercept | 2 | 3 | 8/5 | 1 | b |

 35. (a) $y = \frac{3}{2}x - 3$ (b) $y = -\frac{3}{4}x$ 37. $y = -2x + 4$

 39. $y = 4x + 7$ 41. $y = -\frac{1}{5}x + 6$ 43. $y = 11x - 18$

 45. $y = \frac{1}{2}x + 2$ 47. $y = 1$ 49. (a) parallel

(b) perpendicular (c) parallel (d) perpendicular (e) neither

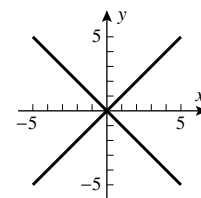
 51. (a) $-\frac{3}{2}$ 53. the union of the graphs of $x - y = 0$ and $x + y = 0$

 (b) $\frac{4}{5}$

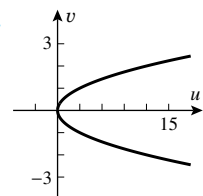
 (c) $\frac{5}{2}$

 (d) $-\frac{15}{2}$

(e) -4



55.


 59. $\frac{49}{6}$