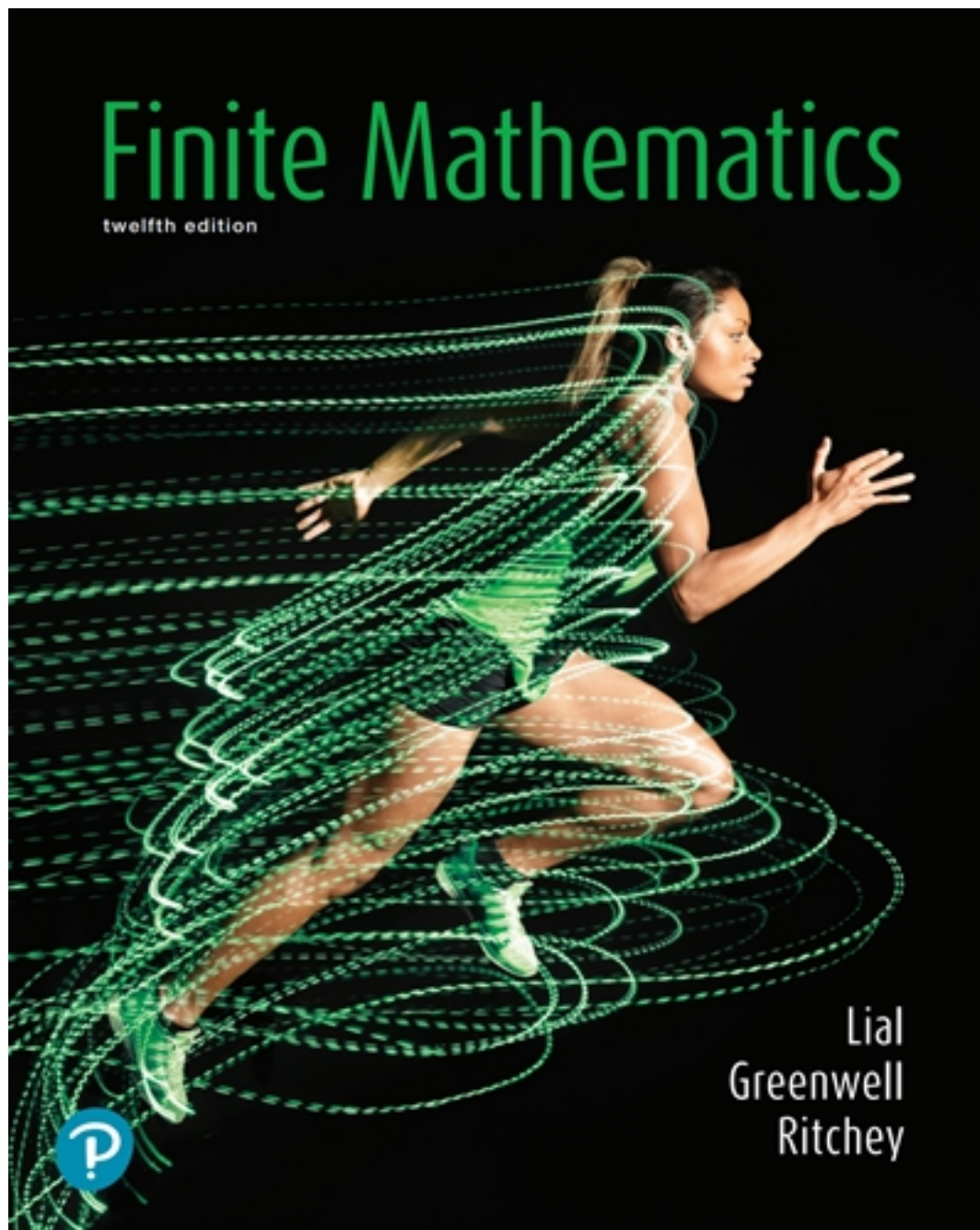


# Solutions for Finite Mathematics 12th Edition by Lial

[CLICK HERE TO ACCESS COMPLETE Solutions](#)



# Solutions

# Complete Instructor Answers

Answers to selected writing exercises are provided.

## Answers to Prerequisite Skills Diagnostic Test

1. 20% 2. 51/35 3.  $x + y = 75$  4.  $s \geq 4p$  5.  $-20/3$  (Sec. R.4) 6.  $-11/5$  (Sec. R.4)  
7.  $(-2, 5]$  (Sec. R.5) 8.  $x \leq -3$  (Sec. R.5) 9.  $y \geq -17/2$  (Sec. R.5) 10.  $p > 3/2$  (Sec. R.5)

## Chapter R Algebra Reference

### Exercises R.1 (page R-5–R-6)

For exercises . . .	1–8	9, 10	11–16	17–24	25–28
Refer to example . . .	2	3	4	5	6

1.  $-x^2 + x + 9$  2.  $-6y^2 + 3y + 10$  3.  $(3/2)z^2 + (5/6)z + 2$   
4.  $(1/2)t^2 + (1/2)t + 2/3$  5.  $-16q^2 + 4q + 6$  6.  $9r^2 - 4r + 19$  7.  $-0.327x^2 - 2.805x - 1.458$   
8.  $0.8r^2 + 3.6r - 1.5$  9.  $-18m^3 - 27m^2 + 9m$  10.  $-12x^4 + 30x^2 + 36x$  11.  $9t^2 + 9ty - 10y^2$   
12.  $18k^2 - 7kq - q^2$  13.  $4 - 9x^2$  14.  $36m^2 - 25$  15.  $(6/25)y^2 + (11/40)yz + (1/16)z^2$   
16.  $(15/16)r^2 - (7/12)rs - (2/9)s^2$  17.  $27p^3 - 1$  18.  $15p^3 + 13p^2 - 10p - 8$  19.  $8m^3 + 1$   
20.  $12k^4 + 21k^3 - 5k^2 + 3k + 2$  21.  $3x^2 + xy + 2xz - 2y^2 - 3yz - z^2$  22.  $2r^2 + 2rs - 5rt - 4s^2 + 8st - 3t^2$   
23.  $x^3 + 6x^2 + 11x + 6$  24.  $x^3 - 2x^2 - 5x + 6$  25.  $x^2 + 4x + 4$  26.  $4a^2 - 16ab + 16b^2$   
27.  $x^3 - 6x^2y + 12xy^2 - 8y^3$  28.  $27x^3 + 27x^2y + 9xy^2 + y^3$

### Exercises R.2 (page R-9)

For exercises . . .	1–4	5–15	16–20	21–32
Refer to example . . .	1	2, 3	3, 2nd CAUTION	4

1.  $7a^2(a + 2)$  2.  $3y(y^2 + 8y + 3)$  3.  $13p^2q(p^2q - 3p + 2q)$   
4.  $10m^2(6m^2 - 12mn + 5n^2)$  5.  $(m + 2)(m - 7)$  6.  $(x + 5)(x - 1)$  7.  $(z + 4)(z + 5)$  8.  $(b - 7)(b - 1)$   
9.  $(a - 5b)(a - b)$  10.  $(s - 5t)(s + 7t)$  11.  $(y - 7z)(y + 3z)$  12.  $(3x + 7)(x - 1)$  13.  $(3a + 7)(a + 1)$   
14.  $(5y + 2)(3y - 1)$  15.  $(7m + 2n)(3m + n)$  16.  $6(a - 10)(a + 2)$  17.  $3m(m + 3)(m + 1)$  18.  $2(2a + 3)(a + 1)$   
19.  $2a^2(4a - b)(3a + 2b)$  20.  $12x^2(x - y)(2x + 5y)$  21.  $(x + 8)(x - 8)$  22.  $(3m + 5)(3m - 5)$   
23.  $10(x + 4)(x - 4)$  24. Prime 25.  $(z + 7y)^2$  26.  $(s - 5t)^2$  27.  $(3p - 4)^2$  28.  $(a - 6)(a^2 + 6a + 36)$   
29.  $(3r - 4s)(9r^2 + 12rs + 16s^2)$  30.  $3(m + 5)(m^2 - 5m + 25)$  31.  $(x - y)(x + y)(x^2 + y^2)$   
32.  $(2a - 3b)(2a + 3b)(4a^2 + 9b^2)$

### Exercises R.3 (page R-12)

For exercises . . .	1–12	13–38
Refer to example . . .	1	2

1.  $\sqrt{7}$  2.  $5p/2$  3.  $8/9$  4.  $2/(t + 2)$  5.  $x - 2$  6.  $4(y + 2)$  7.  $(m - 2)/(m + 3)$   
8.  $(r + 2)/(r + 4)$  9.  $3(x - 1)/(x - 2)$  10.  $(z - 3)/(z + 2)$  11.  $(m^2 + 4)/4$  12.  $(2y + 1)/(y + 1)$  13.  $3k/5$   
14.  $25p^2/9$  15.  $9/(5c)$  16. 2 17.  $1/4$  18.  $3/10$  19.  $2(a + 4)/(a - 3)$  20.  $2/(r + 2)$  21.  $(k - 2)/(k + 3)$   
22.  $(m + 6)/(m + 3)$  23.  $(m - 3)/(2m - 3)$  24.  $2(2n - 1)/(3n - 5)$  25. 1 26.  $(6 + p)/(2p)$   
27.  $(12 - 15y)/(10y)$  28.  $137/(30m)$  29.  $(3m - 2)/[m(m - 1)]$  30.  $(r - 6)/[r(2r + 3)]$  31.  $14/[3(a - 1)]$   
32.  $23/[20(k - 2)]$  33.  $(7x + 1)/[(x - 2)(x + 3)(x + 1)]$  34.  $(y^2 + 1)/[(y + 3)(y + 1)(y - 1)]$   
35.  $k(k - 13)/[(2k - 1)(k + 2)(k - 3)]$  36.  $m(3m - 19)/[(3m - 2)(m + 3)(m - 4)]$  37.  $(4a + 1)/[a(a + 2)]$   
38.  $(5x^2 + 4x - 4)/[x(x - 1)(x + 1)]$

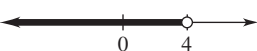


### Exercises R.4 (page R-17)

For exercises . . .	1–8	9–26	27–37
Refer to example . . .	2	3–5	6, 7

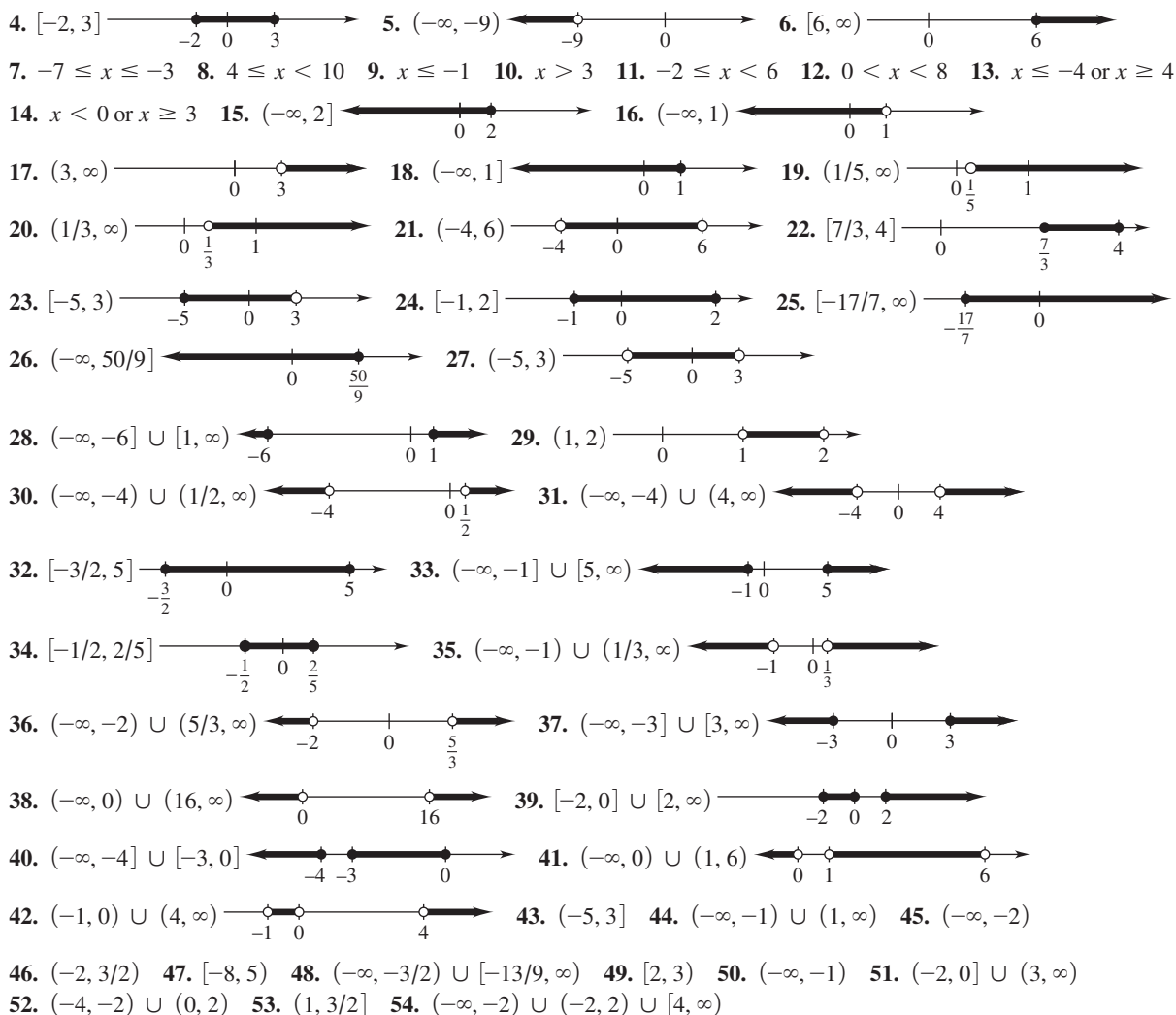
1.  $-12$  2.  $3/4$  3. 12 4.  $-3/8$  5.  $-7/8$  6.  $-6/11$  7. 4 8.  $-10/19$  9.  $-3, -2$   
10.  $-1, 3$  11. 7 12.  $-2, 5/2$  13.  $-1/4, 2/3$  14. 2, 5 15.  $-3, 3$  16.  $-4, 1/2$  17. 0, 4  
18.  $(5 + \sqrt{13})/6 \approx 1.434, (5 - \sqrt{13})/6 \approx 0.232$  19.  $(2 + \sqrt{10})/2 \approx 2.581, (2 - \sqrt{10})/2 \approx -0.581$   
20.  $(-1 + \sqrt{5})/2 \approx 0.618, (-1 - \sqrt{5})/2 \approx -1.618$  21.  $5 + \sqrt{5} \approx 7.236, 5 - \sqrt{5} \approx 2.764$   
22.  $(4 + \sqrt{6})/5 \approx 1.290, (4 - \sqrt{6})/5 \approx 0.310$  23.  $1, 5/2$  24. No real number solutions  
25.  $(-1 + \sqrt{73})/6 \approx 1.257, (-1 - \sqrt{73})/6 \approx -1.591$  26.  $-1, 0$  27. 3 28. 12 29.  $-59/6$  30. 6 31. 3 32.  $-5/2$   
33.  $2/3$  34. 1 35. 2 36. No solution 37. No solution

### Exercises R.5 (page R-22)

For exercises . . .	1–14	15–26	27–38	39–42	43–54
Refer to example . . .	Figure 1, Example 2	2	3	4	5–7

1.  $(-\infty, 4)$    
2.  $[-3, \infty)$   3.  $[1, 2)$  

**A-8** Complete Instructor Answers



**Exercises R.6 (page R-26)**

1.  $1/64$  2.  $1/81$  3. 1 4. 1 5.  $-1/9$  6.  $1/9$  7. 36 8.  $27/64$   
 9.  $1/64$  10.  $8^5$  11.  $1/10^8$  12. 7 13.  $x^2$  14. 1 15.  $8k^3$  16.  $1/(3z^7)$  17.  $x^5/(3y^3)$  18.  $m^3/5^4$  19.  $a^3b^6$   
 20.  $49/(c^6d^4)$  21.  $(a + b)/(ab)$  22.  $(1 - ab^2)/b^2$  23.  $2(m - n)[mn(m + n^2)]$  24.  $(3n^2 + 4m)/(mn^2)$   
 25.  $xy/(y - x)$  26.  $y^4/(xy - 1)^2$  27. 11 28. 3 29. 4 30.  $-25$  31.  $1/2$  32.  $4/3$  33.  $1/16$  34.  $1/5$  35.  $4/3$   
 36.  $1000/1331$  37. 9 38. 3 39. 64 40. 1 41.  $x^4/y^4$  42.  $b/a^3$  43.  $r$  44.  $12^3/y^8$  45.  $3k^{3/2}/8$  46.  $1/(2p^2)$   
 47.  $a^{2/3}b^2$  48.  $y^2/(x^{1/6}z^{5/4})$  49.  $h^{1/3}t^{1/5}/k^{2/5}$  50.  $m^3p/n$  51.  $3x(x^2 + 3x)^2(x^2 - 5)$  52.  $6x(x^3 + 7)(-2x^3 - 5x + 7)$   
 53.  $5x(x^2 - 1)^{-1/2}(x^2 + 1)$  54.  $3(6x + 2)^{-1/2}(27x + 5)$  55.  $(2x + 5)(x^2 - 4)^{-1/2}(4x^2 + 5x - 8)$   
 56.  $(4x^2 + 1)(2x - 1)^{-1/2}(36x^2 - 16x + 1)$

For exercises . . .	1-8	9-26	27-36	37-50	51-56
Refer to example . . .	1	2	3,4	5	6

**Exercises R.7 (page R-30)**

1. 5 2. 6 3.  $-5$  4.  $5\sqrt{2}$  5.  $20\sqrt{5}$  6.  $4y^2\sqrt{2y}$  7. 9 8. 8  
 9.  $7\sqrt{2}$  10.  $9\sqrt{3}$  11.  $9\sqrt{7}$  12.  $-2\sqrt{7}$  13.  $5\sqrt[3]{2}$  14.  $3\sqrt[3]{5}$  15.  $xyz^2\sqrt{2x}$  16.  $4r^3s^4t^6\sqrt{10rs}$  17.  $4xy^2z^3\sqrt[3]{2y^2}$   
 18.  $x^2yz^2\sqrt[4]{y^3z^3}$  19.  $ab\sqrt{ab(b - 2a^2 + b^3)}$  20.  $p^2\sqrt{pq}(pq - q^4 + p^2)$  21.  $\sqrt[6]{a^5}$  22.  $b^2\sqrt[4]{b}$  23.  $|4 - x|$   
 24.  $|3y + 5|$  25. Cannot be simplified 26. Cannot be simplified 27.  $5\sqrt{7}/7$  28.  $\sqrt{10}/2$  29.  $-\sqrt{3}/2$  30.  $\sqrt{2}$   
 31.  $-3(1 + \sqrt{2})$  32.  $-5(2 + \sqrt{6})/2$  33.  $3(2 - \sqrt{2})$  34.  $(5 - \sqrt{10})/3$  35.  $(\sqrt{r} + \sqrt{3})/(r - 3)$   
 36.  $5(\sqrt{m} + \sqrt{5})/(m - 5)$  37.  $\sqrt{y} + \sqrt{5}$  38.  $(z + \sqrt{5z} - \sqrt{z} - \sqrt{5})/(z - 5)$  39.  $-2x - 2\sqrt{x(x + 1)} - 1$   
 40.  $[p^2 + p + 2\sqrt{p(p^2 - 1)} - 1]/(-p^2 + p + 1)$  41.  $-1/[2(1 - \sqrt{2})]$  42.  $1/(3 + \sqrt{3})$   
 43.  $-1/[2x - 2\sqrt{x(x + 1)} + 1]$  44.  $2/[p + \sqrt{p(p - 2)}]$

For exercises . . .	1-22	23-26	27-40	41-44
Refer to example . . .	1,2	3	4	5

### Chapter 1 Linear Functions

#### Exercises 1.1 (page 13–17)

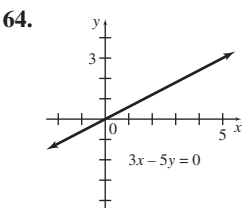
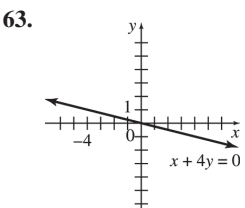
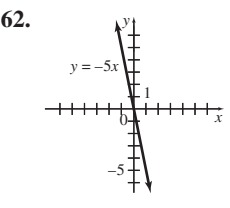
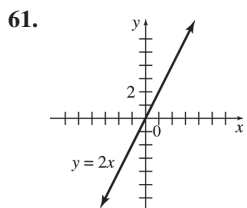
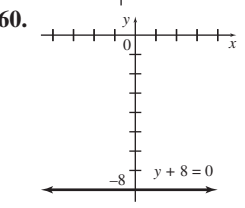
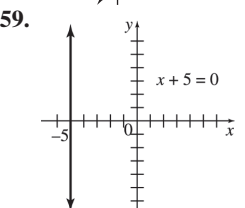
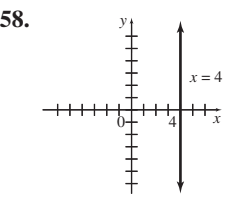
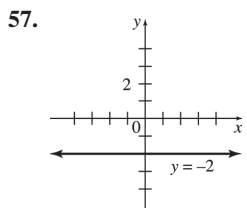
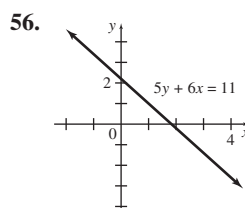
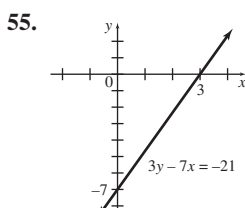
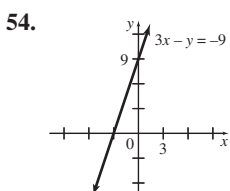
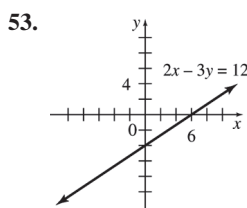
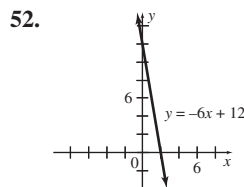
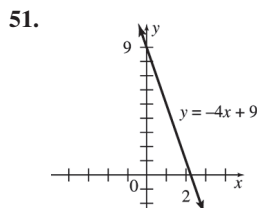
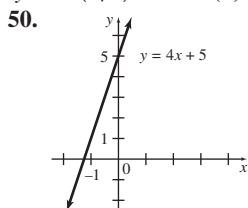
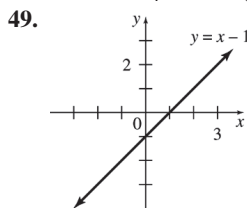
For exercises . . .	5–8	9–12	17,33,34	18,35–38	19–21	22,31	23–28	29,30	32	49–64	65–79
Refer to example . . .	1	3	8	9	4	7	5	2	6	11,12	10,13

W1.  $-3$  W2.  $y = -2x - 13$

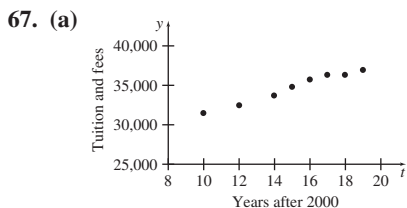
W3.  $y = (2/5)x + 19/30$

W4.  $y = (2/3)x - 7/3$

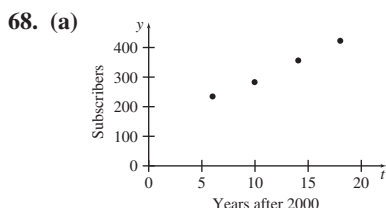
1. False 2. True 3. False 4. False 5.  $3/5$  6.  $-7/4$  7. Not defined 8. 0 9. 1 10. 3 11.  $5/9$  12.  $-4/7$   
 13. Not defined 14. 0 15. 0 16. 0 17. 2 18.  $-1/4$  19.  $y = -2x + 5$  20.  $y = -x + 6$  21.  $y = -7$  22.  $x = -8$   
 23.  $y = -(1/3)x + 10/3$  24.  $y = -x + 7$  25.  $y = 6x - 7/2$  26.  $y = (21/32)x + 33/16$  27.  $x = -8$  28.  $y = 3$   
 29.  $x + 2y = -6$  30.  $2x - y = -4$  31.  $x = -6$  32.  $y = 7$  33.  $3x + 2y = 0$  34.  $2x - y = 9$  35.  $x - y = 7$   
 36.  $3x + 2y = 6$  37.  $5x - y = -4$  38.  $3x + 6y = -2$  39. No 40. (a)  $k = -1/2$  (b)  $k = -7/2$  43. (a) 44. (f)  
 45.  $-4$  46.  $1/2$  48. (a)  $y = -(b/a)x + b$  (b)  $a$  and  $b$



65. (a) 12,000;  $y = 12,000x + 3000$  (b) 8 years 1 month 66. (a) 0.9; each additional cupcake costs \$0.90  
 (b)  $y = 0.9x + 36$  (c) \$198



Yes (b)  $y = 598t + 25,522$ ; the slope indicates that the annual cost of tuition and fees at private four-year colleges is increasing by about \$598 per year. (c) The year 2035 is too far in the future to rely on this equation to predict costs; too many other factors may influence these costs by then.



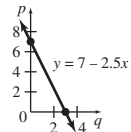
The number of subscribers appears to be increasing at a nearly linear rate.  
 (b)  $y = 15.729t + 138.67$  (c)  $y = 15.688t + 139.42$   
 (e) 390.33 million; 390.43 million

**A-10** Complete Instructor Answers

**69.** (a)  $y = 4.317t + 87.049$  (b) 173.4, which is slightly more than the actual CPI (c) It is increasing at a rate of approximately 4.3 per year. **70.** (a)  $y = 0.53t - 0.043$  (b) About 10.2 yr **71.** (a)  $u = 0.85(220 - x) = 187 - 0.85x$ ,  $l = 0.7(220 - x) = 154 - 0.7x$  (b) 140 to 170 beats per minute (c) 126 to 153 beats per minute (d) The women are 16 and 52. Their pulse is 143 beats per minute. **72.** Approximately 4.3 m/sec **73.** About 86 yr **74.** (a)  $y = -1.93t + 267$  (b) 2026 **75.** (a)  $y = 13,104.18t - 406,022$  (b) About 1,166,480 **76.** (a)  $y = 0.12t + 25.12$  (b)  $y = 0.14t + 22.54$  (c) Women (d) 2038 (e) 30.6 **77.** (a) There appears to be a linear relationship. (b)  $y = 76.9x$  (c) About 780 megaparsecs (about  $1.5 \times 10^{22}$  mi) (d) About 12.4 billion yr **78.** (a)  $T = 0.03t + 15$  (b) About 2103 (c)  $T = 0.02t + 15$ ; about 2170 **79.** (a)  $y_o = 4.625t - 19.25$  (b)  $y = 4.75t - 41.5$  (c) The percent of Americans who had listened to online radio in the previous month increased by 4.625% per year, while the percent of U.S. cellphone users who had ever listened to online radio in a car using a phone increased by 4.75% per year.

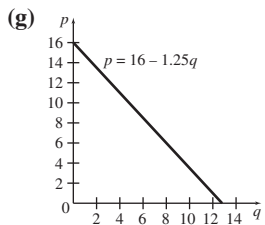
**Exercises 1.2 (page 24–27)**

**W1.** 60 **W2.**

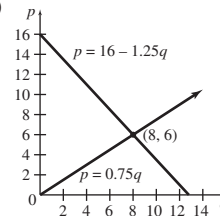


For exercises . . .	9–18	23–26	27–30,41,42,49,50	31–36	37–40,43–48	51–53
Refer to example . . .	1	4	5,6	2,3	7	8

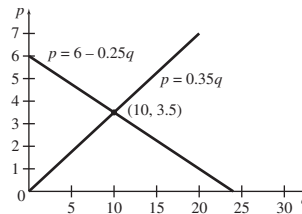
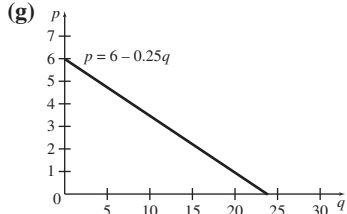
- 1.** True **2.** False **3.** True **4.** True **5.** False **6.** True **7.** True **8.** True **9.** -3 **10.** -13 **11.** 22 **12.** 12 **13.** 0  
**14.** 2 **15.** -4 **16.** -9/2 **17.**  $7 - 5t$  **18.**  $2k^2 - 3$  **23.** If  $R(x)$  is the cost of renting a snowboard for  $x$  hours, then  $R(x) = 2.25x + 10$ . **24.** If  $C(x)$  is the cost of downloading  $x$  songs, then  $C(x) = 0.99x + 10$ . **25.** If  $C(x)$  is the cost of parking a car for  $x$  hours, then  $C(x) = 0.75x + 2$ . **26.** If  $R(x)$  is the cost of renting a car for  $x$  miles, then  $R(x) = 44 + 0.28x$ .  
**27.**  $C(x) = 30x + 100$  **28.**  $C(x) = 45x + 35$  **29.**  $C(x) = 75x + 550$  **30.**  $C(x) = 120x + 12,500$  **31.** (a) \$16 (b) \$11  
(c) \$6 (d) 640 watches (e) 480 watches (f) 320 watches



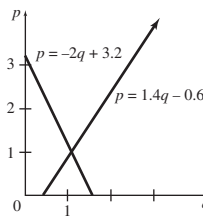
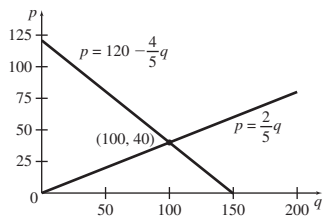
- (g) (h) 0 watches (i) About 1333 watches (j) About 2667 watches (k)  
(l) 800 watches, \$6



- 32.** (a) \$6 (b) \$5 (c) \$3.90 (d) 600 quarts (e) 1100 quarts (f) 1440 quarts  
(g) (h) 0 quarts (i) 800 quarts (j) 1800 quarts (k)  
(l) 1000 quarts; \$3.50



- 33.** (a) (b) 100 tubs, \$40 **34.** (a) (b) About 1120 lb; about \$0.96



- 35.**  $D(q) = 6.9 - 0.4q$  **36.**  $D(q) = 9 - 0.35q$  **37.** (a) 2 units (b) \$980 (c) 52 units **38.** (a) 3 units (b) \$3211  
(c) 13 units **39.** (a)  $C(x) = 3.50x + 90$  (b) 17 shirts (c) 108 shirts **40.** (a)  $C(x) = 2.15x + 525$  (b) 188  
(c) 545 books **41.** (a)  $C(x) = 0.097x + 1.32$  (b) \$1.32 (c) \$98.32 (d) \$98.417 (or \$98.42) (e) 9.7¢ (f) 9.7¢, the cost of producing one additional cup of coffee would be 9.7¢. **42.** (a)  $C(x) = 500,000 + 4.75x$  (b) \$500,000 (c) \$975,000  
(d) \$4.75; each additional item costs \$4.75 to produce. **43.** Break-even quantity is 45 units; don't produce;  $P(x) = 20x - 900$   
**44.** Break-even quantity is about 41 units; produce;  $P(x) = 145x - 6000$  **45.** Break-even quantity is -50 units; impossible to make a profit when  $C(x) > R(x)$  for all positive  $x$ ;  $P(x) = -10x - 500$  (always a loss) **46.** Break-even quantity is -50 units; impossible to make a profit when  $C(x) > R(x)$  for all positive  $x$ ;  $P(x) = -100x - 5000$  (always a loss). **47.** 5 **48.** 26