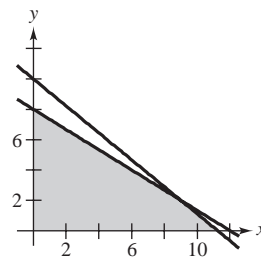


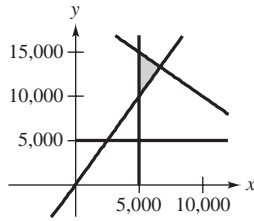
33. $2 \leq x \leq 5$
 $1 \leq y \leq 7$

35. $y \leq \frac{3}{2}x$
 $y \leq -x + 5$
 $y \geq 0$

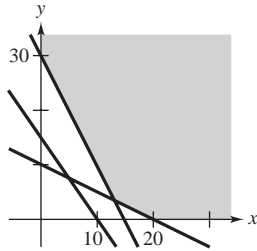
37. $x + \frac{3}{2}y \leq 12$
 $\frac{4}{3}x + \frac{3}{2}y \leq 15$
 $x \geq 0$
 $y \geq 0$



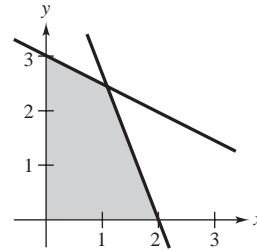
39. x = amount in one account
 y = amount in other account
 $x + y \leq 20,000$
 $x \geq 5000$
 $y \geq 5000$
 $2x \leq y$



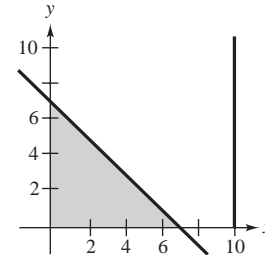
41. x = # of ounces of food X
 y = # of ounces of food Y
 $20x + 10y \geq 300$
 $15x + 10y \geq 150$
 $10x + 20y \geq 200$
 $x, y \geq 0$



23. 3 bags of brand X
 6 bags of brand Y
 Minimum cost: \$195
25. z is maximum at any point on the line segment between points $(2, 0)$ and $(\frac{20}{19}, \frac{45}{19})$.



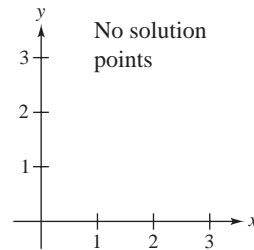
27. The constraint $x \leq 10$ is extraneous.



SECTION 9.2 (page 492)

- Maximum is 17 at $(3, 4)$
 Minimum is 0 at $(0, 0)$
- Maximum is 20 at $(4, 0)$
 Minimum is 0 at $(0, 0)$
- Maximum is 740 at $(60, 20)$
 Minimum is 0 at $(0, 0)$
- Maximum is 2100 at any point on line segment between $(30, 45)$ and $(60, 20)$
 Minimum is 0 at $(0, 0)$
- No maximum
 Minimum is 35 at $(5, 3)$
- No maximum
 Minimum is 20 at $(10, 0)$
- Maximum is 160 at $(40, 0)$
 Minimum is 104 at $(24, 8)$
- Maximum is 56 at $(24, 8)$
 Minimum is 36 at $(36, 0)$
- Maximum is 12 at $(3, 6)$
- Maximum is 10 at $(0, 10)$
- 200 units of model costing \$250
 50 units of model costing \$400
 Maximum profit: \$11,500

29. Feasible set is empty, no maximum
31. (a) No value of t
 (b) $t < 0$
 (c) $t > 0$
 (d) No value of t



SECTION 9.3 (page 507)

1.

x_1	x_2	s_1	s_2	b	Basic Variables
2	1	1	0	8	s_1
1	1	0	1	5	s_2
-1	-2	0	0	0	

3.

x_1	x_2	x_3	s_1	s_2	b	Basic Variables
1	2	0	1	0	12	s_1
1	0	1	0	1	8	s_2
-2	-3	-4	0	0	0	

5. Objective function should be maximized, not minimized.
7. All constraints must be \leq .
9. Maximum is 8 at (8, 0)
11. Maximum is 210 at (0, 21, 21)
13. Maximum is 43 at (7, 3)
15. Maximum is $\frac{83}{19}$ at $(\frac{16}{19}, 0, 0, \frac{5}{19})$
17. Maximum is 25 at (23, 0, 2) or $(\frac{43}{3}, 0, \frac{32}{3})$
19. Maximum is 24 at (0, 12, 0, 0)
21. 200 units at \$250
50 units at \$400
Maximum profit: \$11,500
23. 50 acres of carrots
0 acres of celery and lettuce
Maximum profit: \$3000
25. 322 of Model A
764 of Model B
484 of Model C
Maximum profit: \$79,310
27. 9 television ads
4 newspaper ads
Maximum audience: 147,000,000
29. \$100,000 of type A
\$62,500 of type B
\$87,500 of type C
Maximum return: \$26,500
31. 8 audits, 8 tax returns
Maximum revenue: \$18,400
33. After one iteration, the simplex tableau is as follows.

x_1	x_2	s_1	s_2	b	Basic Variables
$-\frac{1}{2}$	0	1	$\frac{3}{2}$	7	s_1
$-\frac{1}{2}$	1	0	$\frac{1}{2}$	2	s_2
-2	0	0	1	4	

35. After one iteration, $x_1 = 2$, $x_2 = 0$, and $z = 5$.
Bringing x_2 in the basis after another iteration,
 $x_1 = \frac{20}{19}$, $x_2 = \frac{45}{19}$, and z still equals 5.

37. Maximum is $\frac{85100}{177}$ at $(0, \frac{2740}{531}, \frac{28250}{531}, \frac{16655}{531})$

SECTION 9.4 (page 518)

1. (Maximize)
Objective function:
 $z = 4y_1 + 4y_2$
Constraints:
 $2y_1 + y_2 \leq 3$
 $y_1 + 2y_2 \leq 3$
 $y_1, y_2 \geq 0$
3. (Maximize)
Objective function:
 $z = 23y_1 + 10y_2 + 40y_3$
Constraints:
 $3y_1 + y_2 + 8y_3 \leq 4$
 $2y_1 + y_3 \leq 1$
 $y_1 + y_2 + 2y_3 \leq 1$
 $y_1, y_2, y_3 \geq 0$
5. (Maximize)
 $z = 7y_1 + 4y_2$
Constraints:
 $y_1 + y_2 \leq 14$
 $y_1 + 2y_2 \leq 20$
 $2y_1 + y_2 \leq 24$
 $y_1, y_2 \geq 0$
7. (a) Minimum is 4 (1, 1)
(b) (Maximize)
Objective function:
 $z = 3y_1 + 5y_2$
Constraints:
 $y_1 + 3y_2 \leq 2$
 $2y_1 + 2y_2 \leq 2$
 $y_1, y_2 \geq 0$
(c) Maximum is 4 at $(\frac{1}{2}, \frac{1}{2})$
9. (a) Minimum is 8 at $(\frac{4}{3}, \frac{5}{3})$
(b) (Maximize)
Objective function:
 $z = 3y_1 + 2y_2$
Constraints:
 $y_1 - y_2 \leq 1$
 $y_1 + 2y_2 \leq 4$
 $y_1, y_2 \geq 0$
(c) Maximum is 8 at (2, 1)
11. (a) Minimum is 9 at $(\frac{1}{2}, 2)$ (b) (Maximize)
Objective function:
 $z = 4y_1 + 2y_2$
Constraints:
 $4y_1 \leq 6$
 $y_1 + y_2 \leq 3$
 $y_1, y_2 \geq 0$
(c) Maximum is 9 at $(\frac{3}{2}, \frac{3}{2})$

13. Minimum is 1.8 at (1, 1.8)
 15. Minimum is 6 at (1, 4)
 17. Minimum is 18 at $(\frac{1}{5}, 2, \frac{7}{5})$
 19. Minimum is 64 at $(\frac{4}{3}, 4, 16)$
 21. 1 liter of dietary drink I
 1 liter of dietary drink II
 Minimum cost: \$5
 23. 3 liters of dietary drink I
 0 liters of dietary drink II
 Minimum cost: \$3
 25. $\frac{5}{3}$ liters of dietary drink I
 $\frac{4}{3}$ liters of dietary drink II
 Minimum cost: \$19
 27. 5 liters of dietary drink I
 0 liters of dietary drink II
 Minimum cost: \$5
 29. 22.5 days for plant I
 10.5 days for plant II
 4.75 days for plant III
 Minimum operating cost: \$2,152,500
 31. 0 days for refinery I
 120 days for refinery II
 Minimum operating cost: \$3,600,000
 33. Minimum is 87.14 at (21.43, 2.86, 25.71, 0)

SECTION 9.5 (page 529)

1.

x_1	x_2	s_1	s_2	b	Basic Variables
2	1	-1	0	4	s_1
1	1	0	1	8	s_2
-10	-4	0	0	0	

3.

x_1	x_2	s_1	s_2	b	Basic Variables
2	1	1	0	4	s_1
1	3	0	-1	2	s_2
1	1	0	0	0	

5.

x_1	x_2	x_3	s_1	s_2	s_3	b	Basic Variables
4	1	0	-1	0	0	10	s_1
1	1	3	0	1	0	30	s_2
2	1	4	0	0	0	16	s_3
-1	0	-1	0	0	0	0	

7. Maximum is 12 at (0, 6)
 9. Minimum is 16 at any point on the line segment between (0, 8) and (2, 7)
 11. Maximum is 25 at (5, 20, 0)
 13. Maximum is 40 at (0, 8)
 15. Maximum is 30 at (5, 20, 0)
 17. Minimum is 15 at (5, 10)
 19. Minimum is -20 at $(11, \frac{1}{2}, 0)$
 21. Maximum is 9 at (4, 1)
 23. Maximum is 4 at (1, 4)
 25. Maximum is 9 at (4, 5)
 27. Maximum is 3 at (0, 3)
 29. 300 tires from S_1 to C_1
 600 tires from S_1 to C_2
 200 tires from S_2 to C_1
 Minimum cost: \$1100
 31. 600 tires from S_1 to C_2
 500 tires from S_2 to C_1
 Minimum cost \$1100

33.

	<i>Customer 1</i>	<i>Customer 2</i>
<i>Factory 1</i>	0	200
<i>Factory 2</i>	200	100

Minimum cost \$14,500

35. 9 television ads
 4 newspaper ads
 Maximum audience: 147,000,000

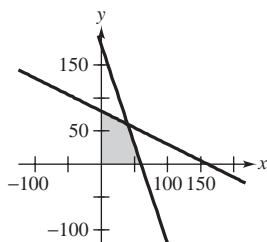
37.

	Outlet I	Outlet II
Plant A	a	$5000 - a$
Plant B	$3000 - a$	a

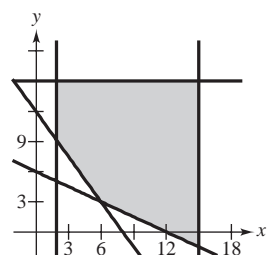
Minimum cost: \$40,000

REVIEW EXERCISES – CHAPTER 9 (page 531)

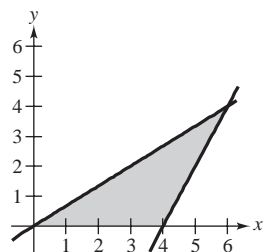
1.



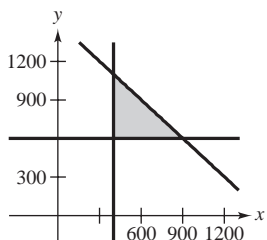
3.



5.



7. $x + y \leq 1500$, $x \geq 400$, $y \geq 600$



- 9. Maximum is 47 at (5, 8)
- 11. Minimum is 3 at (3, 0)
Maximum is 29 at (5, 8)
- 13. Minimum is -6 at (0, 6)
Maximum is $\frac{64}{3}$ at $(8, \frac{8}{3})$
- 15. Maximum is 26 at (12, 7)
- 17. Maximum is 20 at (0, 9.6, 0.8)
- 19. Maximum is 232 at (100, 132)
- 21. Maximum is 3599 at (110, 537, 146)
- 23. (Maximize) Objective function:
 $z = 30y_1 + 75y_2$
Constraints:
 $y_1 + 3y_2 \leq 7$
 $y_1 + 6y_2 \leq 3$
 $2y_1 + 4y_2 \leq 1$
 $y_1, y_2 \geq 0$
- 25. Minimum is 75 at (5, 2)
- 27. Minimum is 6006 at $(\frac{81}{2}, 138, 111)$
- 29. Minimum is $\frac{118}{3}$ at $(\frac{4}{3}, \frac{1}{3}, 0)$
- 31. Maximum is 31 at (1, 15)
- 33. Maximum is 67 at (7, 27, 26)
- 35. Minimum is 90 at (10, 0, 0)
- 37. Maximum is \$500 for 2 vests and 5 purses.
- 39. Minimum is \$4800 for 7 days on mine A, 5 days on mine B, and 24 days on mine C.

Chapter 10

SECTION 10.1 (page 541)

- 1. 0.4281×10^4
- 3. -0.262×10^1
- 5. -0.121×10^{-2}
- 7. 0.125×10^0
- 9. (a) 0.331×10^3
- 11. (a) -0.926×10^2
- (b) 0.3310×10^3
- (b) -0.9265×10^2
- 13. (a) 0.438×10^0
- 15. (a) 0.143×10^0
- (b) 0.4375×10^0
- (b) 0.1429×10^0
- 17. Approximate: -3700
Exact: -3694.7352
- 19. Approximate: $x = 23.8, y = 0$
Exact: $x = 10, y = 1$