

# Appendices

## Appendix A: Equations and Inequalities

1. true.
2. true.
3. false.
4. false.
5. B
6. The student's answer is not correct. Additional answers will vary.
7.  $\{-4\}$
8.  $\{-5\}$
9.  $\{1\}$
10.  $\{-1\}$
11.  $\{-\frac{2}{7}\}$
12.  $\{\frac{5}{12}\}$
13.  $\{-\frac{7}{8}\}$
14.  $\{-\frac{6}{11}\}$
15.  $\{-1\}$
16.  $\{-\frac{10}{19}\}$
17.  $\{10\}$
18.  $\{-5\}$
19.  $\{75\}$
20.  $\{3\}$
21.  $\{0\}$
22.  $\{0\}$
23. identity;  $\{\text{all real numbers}\}$
24. identity;  $\{\text{all real numbers}\}$
25. conditional equation;  $\{0\}$
26. conditional equation;  $\{\frac{19}{5}\}$
27. contradiction;  $\emptyset$
28. contradiction;  $\emptyset$
29. (a) E  
(b) C  
(c) A  
(d) B  
(e) D
30. D;  $\{\frac{1}{3}, 7\}$
31. B;  $\{\frac{-5 \pm \sqrt{7}}{2}\}$
32. A;  $\{-\frac{1}{3}, 6\}$
33.  $\{2, 3\}$
34.  $\{-4, 2\}$
35.  $\{-\frac{2}{5}, 1\}$
36.  $\{-\frac{5}{2}, 3\}$
37.  $\{-\frac{3}{4}, 1\}$
38.  $\{-\frac{5}{6}, 2\}$
39.  $\{\pm 4\}$
40.  $\{\pm 5\}$
41.  $\{\pm 3\sqrt{3}\}$
42.  $\{\pm 4\sqrt{3}\}$
43.  $-5 \pm 2\sqrt{10}$
44.  $7 \pm 2\sqrt{6}$
45.  $\{\frac{1 \pm 2\sqrt{3}}{3}\}$
46.  $\{\frac{-1 \pm 2\sqrt{5}}{4}\}$
47.  $\{1, 3\}$

48.  $\{3, 4\}$

49.  $\left\{\frac{1 \pm \sqrt{5}}{2}\right\}$

50.  $\left\{\frac{3 \pm \sqrt{17}}{2}\right\}$

51.  $\{3 \pm \sqrt{2}\}$

52.  $\{2 \pm \sqrt{3}\}$

53.  $\left\{\frac{-1 \pm \sqrt{97}}{4}\right\}$

54.  $\left\{\frac{-3 \pm 3\sqrt{129}}{16}\right\}$

55.  $\left\{\frac{-2 \pm \sqrt{10}}{2}\right\}$

56.  $\left\{\frac{1 \pm \sqrt{13}}{2}\right\}$

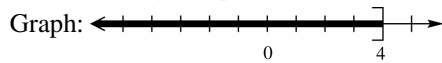
57.  $\left\{\frac{-3 \pm \sqrt{41}}{8}\right\}$

58.  $\left\{\frac{2 \pm \sqrt{10}}{3}\right\}$

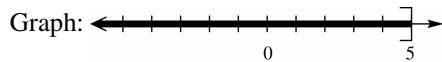
59. (a) F            (b) J  
 (c) A            (d) H  
 (e) I            (f) D  
 (g) B            (h) G  
 (i) E            (j) C

60. D

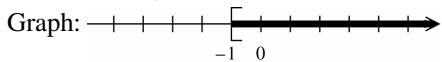
61. Solution set:  $(-\infty, 4]$



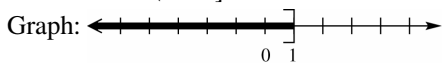
62. Solution set:  $(-\infty, 5]$



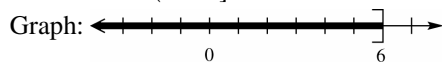
63. Solution set:  $[-1, \infty)$



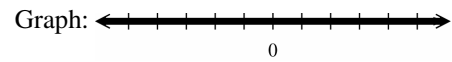
64. Solution set:  $(-\infty, 1]$



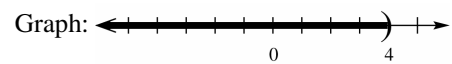
65. Solution set:  $(-\infty, 6]$



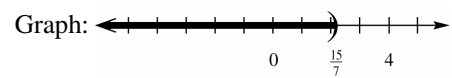
66. Solution set:  $(-\infty, \infty)$



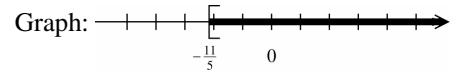
67. Solution set:  $(-\infty, 4)$



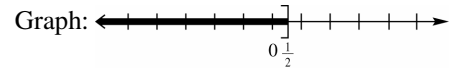
68. Solution set:  $(-\infty, \frac{15}{7})$



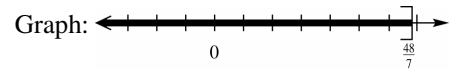
69. Solution set:  $[-\frac{11}{5}, \infty)$



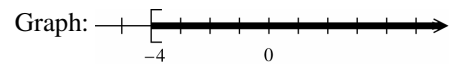
70. Solution set:  $(-\infty, \frac{1}{2}]$



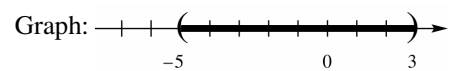
71. Solution set:  $(-\infty, \frac{48}{7}]$



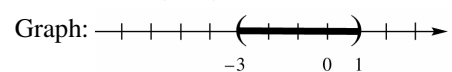
72. Solution set:  $[-4, \infty)$



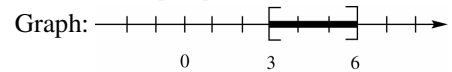
73. Solution set:  $(-5, 3)$



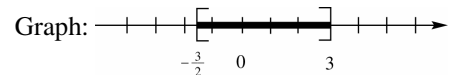
74. Solution set:  $(-3, 1)$



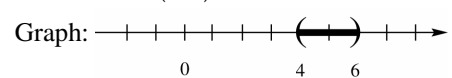
75. Solution set:  $[3, 6]$



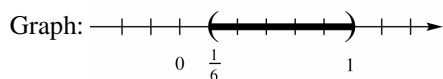
76. Solution set:  $[-\frac{3}{2}, 3]$



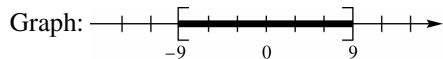
77. Solution set:  $(4, 6)$



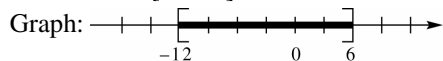
78. Solution set:  $(\frac{1}{6}, 1)$



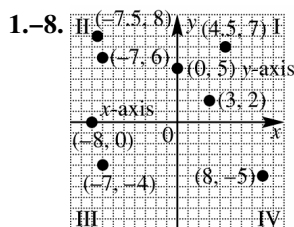
79. Solution set:  $[-9, 9]$



80. Solution set:  $[-12, 6]$



### Appendix B: Graphs of Equations



9. II

10. IV

11. III

12. I

13. (a) I

(b) IV

(c) III

(d) IV

14. False.  $(-1, 3)$  lies in Quadrant II.

15. False. The expression should be

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

16. True

17. True

18. True

19. Yes

20. Yes

21. No

22. Yes

23. 6

24. 5

25. (a)  $8\sqrt{2}$   
(b)  $(-9, -3)$

26. (a) 10  
(b)  $(-1, -1)$

27. (a)  $\sqrt{34}$   
(b)  $(\frac{11}{2}, \frac{7}{2})$

28. (a)  $3\sqrt{41}$   
(b)  $(0, \frac{5}{2})$

29. (a)  $\sqrt{202}$   
(b)  $(-\frac{5}{2}, -\frac{1}{2})$

30. (a)  $2\sqrt{17}$   
(b)  $(5, 2)$

31. (a)  $\sqrt{133}$   
(b)  $(2\sqrt{2}, \frac{3\sqrt{5}}{2})$

32. (a)  $3\sqrt{55}$   
(b)  $(2\sqrt{7}, \frac{7\sqrt{3}}{2})$

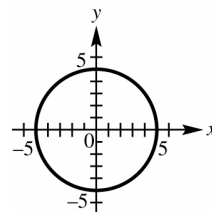
33.  $-1; 5$

34.  $-5; 3$

35.  $9 + \sqrt{119}; 9 - \sqrt{119}$

36.  $-3; 13$

37.  $25 = x^2 + y^2$



38.  $9 = (x + 5)^2 + (y - 6)^2$

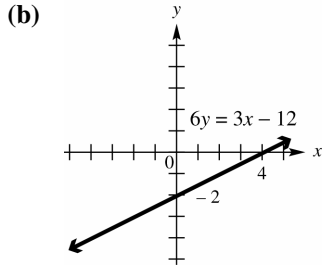
39. The estimate is 24.15%. This is close to the actual figure of 24.4%.

40. \$11,563.

In exercises 41–46, other ordered pairs are possible.

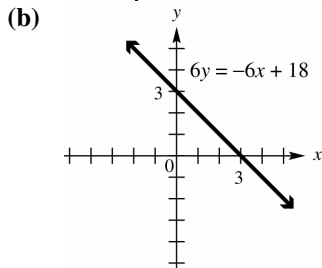
41. (a)

$x$	$y$
0	-2
4	0
2	-1



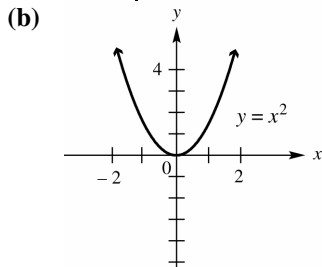
42. (a)

$x$	$y$
0	3
3	0
1	2



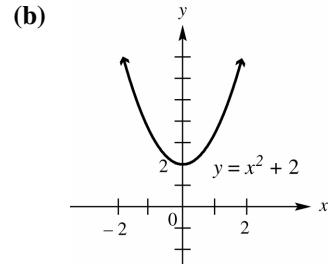
43. (a)

$x$	$y$
0	0
1	1
-2	4



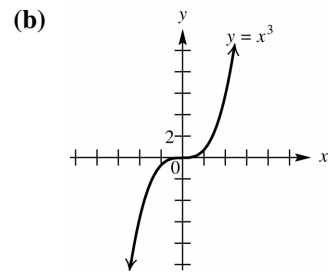
44. (a)

$x$	$y$
0	2
-1	3
2	6



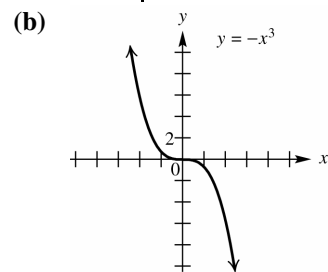
45. (a)

$x$	$y$
0	0
-1	-1
2	8



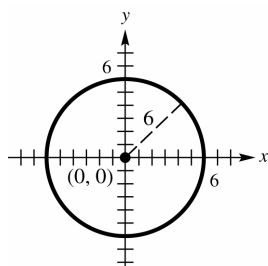
46. (a)

$x$	$y$
0	0
1	-1
2	-8



47. (a)  $x^2 + y^2 = 36$

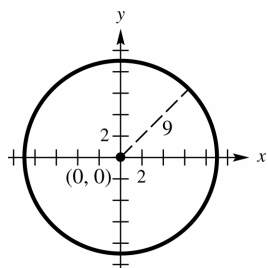
(b)



$x^2 + y^2 = 36$

48. (a)  $x^2 + y^2 = 81$

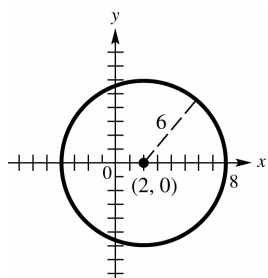
(b)



$x^2 + y^2 = 81$

49. (a)  $(x-2)^2 + y^2 = 36$

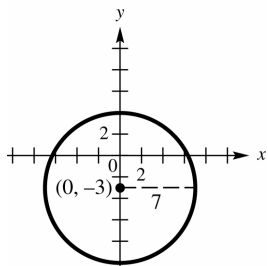
(b)



$(x-2)^2 + y^2 = 36$

50. (a)  $x^2 + (y+3)^2 = 49$

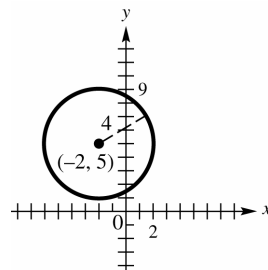
(b)



$x^2 + (y+3)^2 = 49$

51. (a)  $(x+2)^2 + (y-5)^2 = 16$

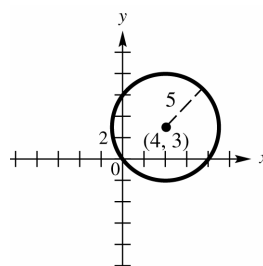
(b)



$(x+2)^2 + (y-5)^2 = 16$

52. (a)  $(x-4)^2 + (y-3)^2 = 25$

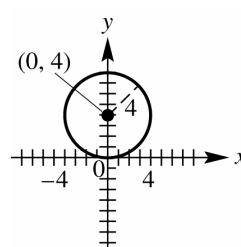
(b)



$(x-4)^2 + (y-3)^2 = 25$

53. (a)  $x^2 + (y-4)^2 = 16$

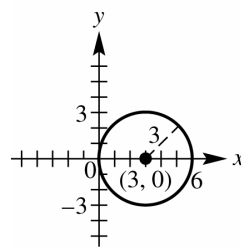
(b)



$x^2 + (y-4)^2 = 16$

54. (a)  $(x-3)^2 + y^2 = 9$

(b)



$(x-3)^2 + y^2 = 9$

55.  $(x-3)^2 + (y-1)^2 = 4$

56.  $(x+1)^2 + (y+2)^2 = 9$

57.  $(x+2)^2 + (y-2)^2 = 4$

58.  $(x-3)^2 + (y+3)^2 = 9$

**Appendix C: Functions**

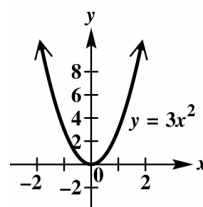
1. function
2. function
3. not a function
4. not a function
5. function
6. function
7. not a function; domain:  $\{0, 1, 2\}$ ;  
range:  $\{-4, -1, 0, 1, 4\}$
8. function; domain:  $\{2, 3, 4, 5\}$ ;  
range:  $\{5, 7, 9, 11\}$
9. function; domain:  $\{2, 3, 5, 11, 17\}$ ;  
range:  $\{1, 7, 20\}$
10. not a function; domain:  $\{1, 2, 3, 5\}$ ;  
range:  $\{10, 15, 19, 27\}$
11. function; Domain:  $\{0, -1, -2\}$ ;  
range:  $\{0, 1, 2\}$
12. function; Domain:  $\{0, 1, 2\}$ ;  
range:  $\{0, -1, -2\}$
13. function; domain:  $(-\infty, \infty)$ ; range:  $(-\infty, \infty)$
14. function; domain:  $(-\infty, \infty)$ ; range:  $(-\infty, 4]$
15. not a function; domain:  $[3, \infty)$ ;  
range:  $(-\infty, \infty)$
16. function; domain:  $(-\infty, \infty)$ ; range:  $(-\infty, \infty)$
17. not a function; domain:  $[-4, 4]$ ; range:  $[-3, 3]$
18. function; domain:  $[-2, 2]$ ; range:  $[0, 4]$
19. function; domain:  $(-\infty, \infty)$ ; range:  $[0, \infty)$
20. function; domain:  $(-\infty, \infty)$ ; range:  $(-\infty, \infty)$
21. not a function; domain:  $[0, \infty)$  range:  $(-\infty, \infty)$
22. not a function; domain:  $[0, \infty)$  range:  $(-\infty, \infty)$
23. function; domain:  $(-\infty, \infty)$ ; range:  $(-\infty, \infty)$
24. function ; domain:  $(-\infty, \infty)$ ; range:  $(-\infty, \infty)$
25. function; domain:  $[0, \infty)$ ; range:  $[0, \infty)$
26. function; domain:  $[0, \infty)$ ; range:  $(-\infty, 0]$
27. function; domain:  $[-\frac{1}{4}, \infty)$ ; range:  $[0, \infty)$
28. function; domain:  $(-\infty, \frac{7}{2}]$ ; range:  $[0, \infty)$
29. function; domain:  $(-\infty, 3) \cup (3, \infty)$ ;  
range:  $(-\infty, 0) \cup (0, \infty)$
30. function; domain:  $(-\infty, 5) \cup (5, \infty)$ ;  
range:  $(-\infty, 0) \cup (0, \infty)$
31. B
32. Answers will vary. An example is: The cost of gasoline depends on the number of gallons used; so cost is a function of number of gallons.
33. 4
34. 13
35. -11
36. -59
37. 3
38. 11
39.  $\frac{11}{4}$
40.  $-\frac{1}{16}$
41.  $-3p + 4$
42.  $-k^2 + 4k + 1$
43.  $-3x - 2$
44.  $-3a - 8$
45. (a) 2 (b) 3
46. (a) 5 (b) 11
47. (a) 15 (b) 10
48. (a) 1 (b) 7
49. (a) 3 (b) -3
50. (a) -3 (b) 2
51. (a) 0 (b) 4  
(c) 2 (d) 4
52. (a) 5 (b) 0  
(c) 2 (d) 4

53. (a) 11 (b) 9  
 (c) -2 (d)  $x = 2, 7, 8$   
 (e)  $\sqrt{104}$
54. (a) 1.2 (b) 5  
 (c) (0, 3.6) (d) (3, 0)
55. (a)  $[4, \infty)$  (b)  $(-\infty, -1]$   
 (c)  $[-1, 4]$
56. (a)  $(-\infty, 1]$  (b)  $[4, \infty)$   
 (c)  $[1, 4]$
57. (a)  $(-\infty, 4]$  (b)  $[4, \infty)$   
 (c) none
58. (a) none (b)  $(-\infty, \infty)$   
 (c) none
59. (a) none (b)  $(-\infty, -2]; [3, \infty)$   
 (c)  $(-2, 3)$
60. (a)  $(3, \infty)$  (b)  $(-\infty, -3)$   
 (c)  $(-3, 3]$
61. (a) Yes, it is the graph of a function.  
 (b)  $[0, 24]$   
 (c) 1200 megawatts  
 (d) The most electricity was used at 17 hr or 5 P.M. The least electricity was used at 4 A.M.  
 (e)  $f(12) \approx 1900$ ; At 12 noon, electricity use is about 1900 megawatts.  
 (f) increasing from 4 A.M. to 5 P.M.; decreasing from midnight to 4 A.M. and from 5 P.M. to midnight
62. (a) 240 feet high  
 (b) 192 feet at 1 second and at 5 seconds  
 (c) The ball is going up from 0 to 3 seconds and down from 3 to 7 seconds.  
 (d) 256 feet at 3 seconds.  
 (e) 7 seconds

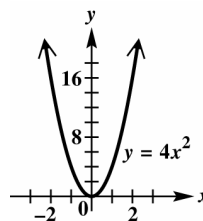
## Appendix D: Graphing Techniques

1. (a) B (b) E  
 (c) F (d) A  
 (e) D (f) C
2. (a) E (b) C  
 (c) D (d) A  
 (e) B
3. (a) B (b) A  
 (c) G (d) C  
 (e) F (f) D  
 (g) H (h) E  
 (i) I

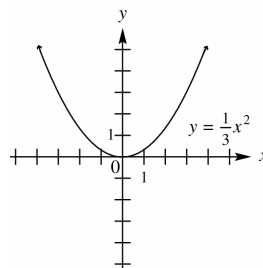
4.



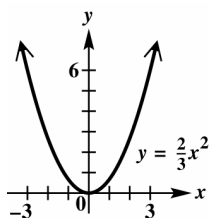
5.



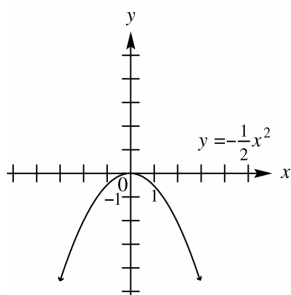
6.



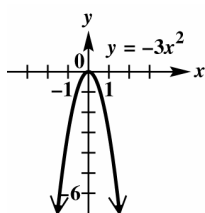
7.



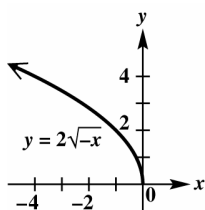
8.



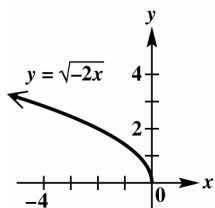
9.



10.



11.



12. (a) (4,12)

(b) (8,16)

13. (a) (8,3)

(b) (8,48)

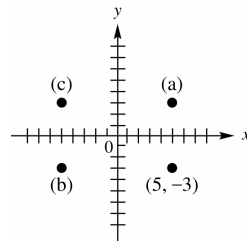
14. (a) (8,-12)

(b) (-8,12)

15. (a) The point that is symmetric to (5, -3) with respect to the  $x$ -axis is (5, 3).

(b) The point that is symmetric to (5, -3) with respect to the  $y$ -axis is (-5, -3).

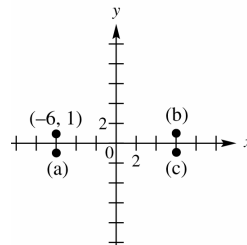
(c) The point that is symmetric to (5, -3) with respect to the origin is (-5, 3).



16. (a) The point that is symmetric to (-6, 1) with respect to the  $x$ -axis is (-6, -1).

(b) The point that is symmetric to (-6, 1) with respect to the  $y$ -axis is (6, 1).

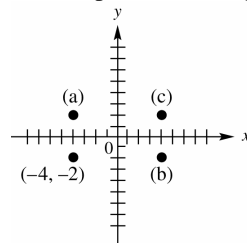
(c) The point that is symmetric to (-6, 1) with respect to the origin is (6, -1).



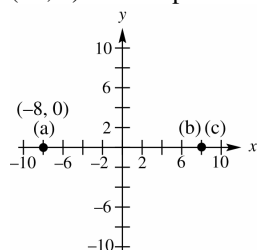
17. (a) The point that is symmetric to (-4, -2) with respect to the  $x$ -axis is (-4, 2).

(b) The point that is symmetric to (-4, -2) with respect to the  $y$ -axis is (4, -2).

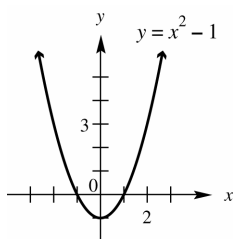
(c) The point that is symmetric to (-4, -2) with respect to the origin is (4, 2).



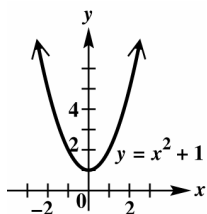
18. (a) The point that is symmetric to  $(-8, 0)$  with respect to the  $x$ -axis is  $(-8, 0)$ , since this point lies on the  $x$ -axis.  
 (b) The point that is symmetric to the point  $(-8, 0)$  with respect to the  $y$ -axis is  $(8, 0)$ .  
 (c) The point that is symmetric to the point  $(-8, 0)$  with respect to the origin is  $(8, 0)$ .



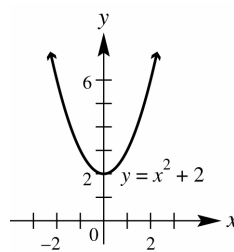
19.  $y$ -axis  
 20.  $y$ -axis  
 21.  $x$ -axis,  $y$ -axis, origin.  
 22.  $x$ -axis, the  $y$ -axis, and the origin.  
 23. the origin only  
 24. the origin only  
 25. none of these  
 26. none of these  
 27.



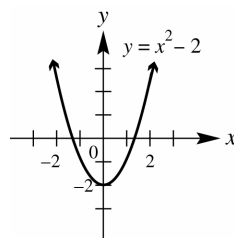
28.



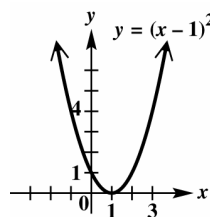
29.



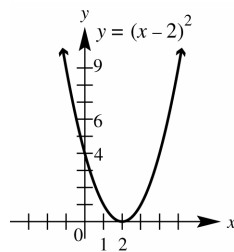
30.



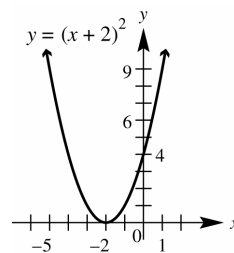
31.



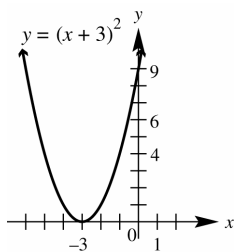
32.



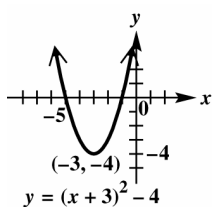
33.



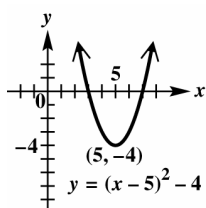
34.



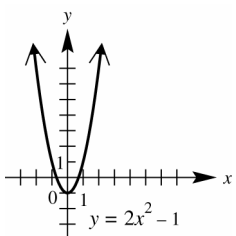
35.



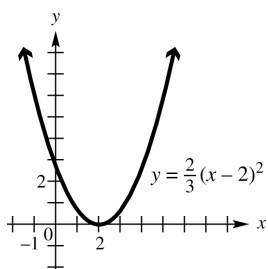
36.



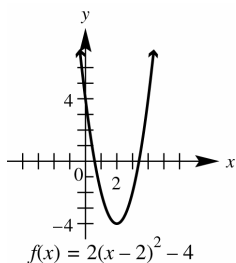
37.



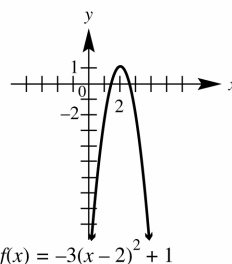
38.



39.



40.



41. It is the graph of  $f(x) = |x|$  translated 1 unit to the left, reflected across the  $x$ -axis, and translated 3 units up. The equation is  $y = -|x + 1| + 3$ .

42. It is the graph of  $g(x) = \sqrt{x}$  translated 4 units to the left, reflected across the  $x$ -axis, and translated 2 units up. The equation is  $y = -\sqrt{x + 4} + 2$ .

43. It is the graph of  $f(x) = \sqrt{x}$  translated 4 units left, stretched vertically, and then translated 4 units down. The equation is  $y = 2\sqrt{x + 4} - 4$ .

44. It is the graph of  $f(x) = |x|$  translated 2 units to the right, shrunk vertically by a factor of  $\frac{1}{2}$ , and translated 1 unit down. The equation is  $y = \frac{1}{2}|x - 2| - 1$ .

45.  $g(x) = 2x + 13$

46.  $g(x) = -x + 4$

47. Answers will vary.

There are four possibilities for the constant,  $c$ .

i)  $c > 0$   $|c| > 1$  The graph of  $F(x)$  is stretched vertically by a factor of  $c$ .

ii)  $c > 0$   $|c| < 1$  The graph of  $F(x)$  is shrunk vertically by a factor of  $c$ .

iii)  $c < 0$   $|c| > 1$  The graph of  $F(x)$  is stretched vertically by a factor of  $-c$  and reflected over the  $x$ -axis.

iv)  $c < 0$   $|c| < 1$  The graph of  $F(x)$  is shrunk vertically by a factor of  $-c$  and reflected over the  $x$ -axis.

48. The graph of  $y = F(x+h)$  represents a horizontal shift of the graph of  $y = F(x)$ . If  $h > 0$ , it is a shift to the left  $h$  units. If  $h < 0$ , it is a shift to the right  $-h$  units ( $h$  is negative). The graph of  $y = F(x)+h$  is not the same as the graph of  $y = F(x+h)$ . The graph of  $y = F(x)+h$  represents a vertical shift of the graph of  $y = F(x)$ .