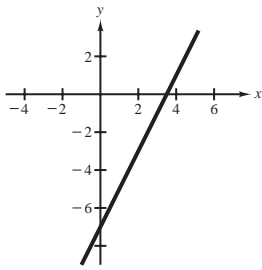


95. No, every relation is not a function because some relations have more than one y value paired with each x value. For example, $\{(4, 3), (4, -2)\}$ is a relation, but not a function.

97. You can name the function (f, g , etc.). That is convenient when there is more than one function used in solving a problem. The values of the independent and the dependent variables are easily seen in function notation.

Section 2.6 Graphs of Functions

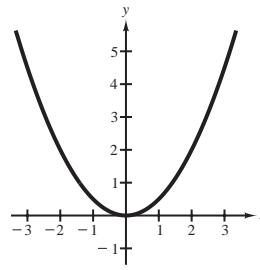
1.



Domain: $-\infty < x < \infty$

Range: $-\infty < y < \infty$

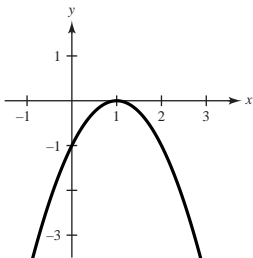
3.



Domain: $-\infty < x < \infty$

Range: $[0, \infty)$ or $0 \leq y < \infty$

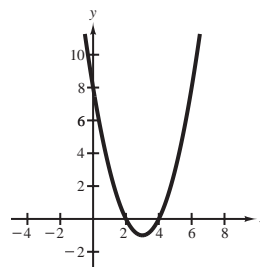
5.



Domain: $-\infty < x < \infty$

Range: $(-\infty, 0]$ or $-\infty < y \leq 0$

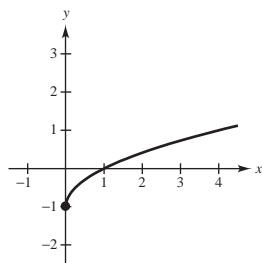
7.



Domain: $-\infty < x < \infty$

Range: $[-1, \infty)$ or $-1 \leq y < \infty$

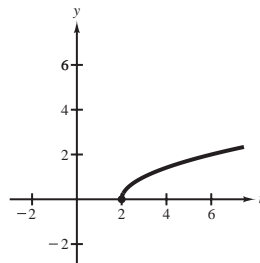
9.



Domain: $0 \leq x < \infty$

Range: $-1 \leq y < \infty$

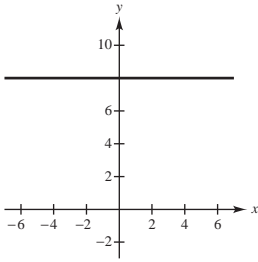
11.



Domain: $[2, \infty)$ or $2 \leq t < \infty$

Range: $[0, \infty)$ or $0 \leq y < \infty$

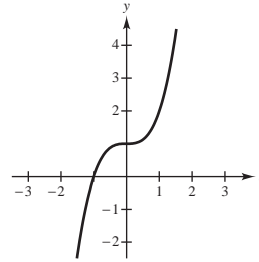
13.



Domain: $-\infty < x < \infty$

Range: $y = 8$

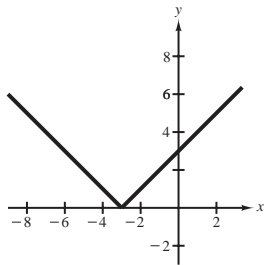
15.



Domain: $-\infty < s < \infty$

Range: $-\infty < y < \infty$

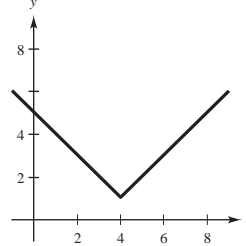
17.



Domain: $-\infty < x < \infty$

Range: $[0, \infty)$ or $0 \leq y < \infty$

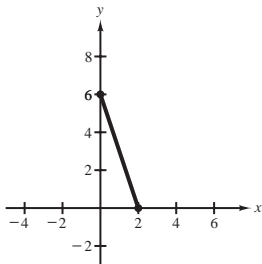
19.



Domain: $-\infty < x < \infty$

Range: $[1, \infty)$ or $1 \leq y < \infty$

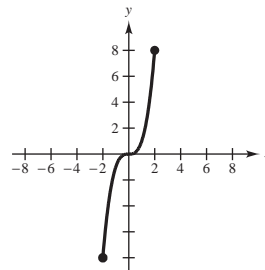
21.



Domain: $0 \leq x \leq 2$ or $[0, 2]$

Range: $0 \leq y \leq 6$ or $[0, 6]$

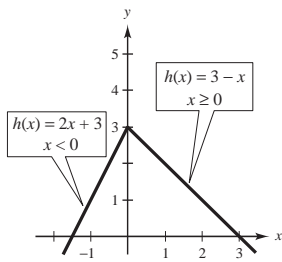
23.



Domain: $-2 \leq x \leq 2$ or $[-2, 2]$

Range: $-8 \leq y \leq 8$ or $[-8, 8]$

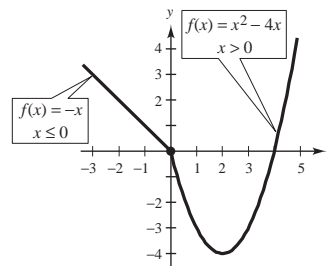
25.



Domain: $-\infty < x < \infty$

Range: $(-\infty, 3]$ or $\infty < y \leq 3$

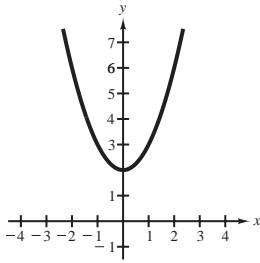
27.



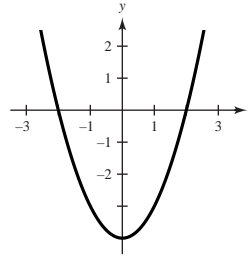
Domain: $-\infty < x < \infty$

Range: $-4 \leq y < \infty$ or $[-4, \infty)$

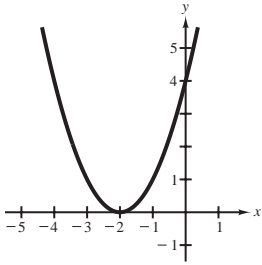
51. (a) Vertical shift 2 units upward



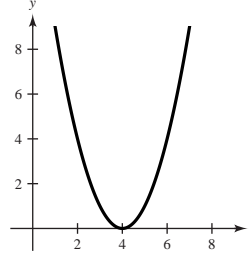
(b) Vertical shift 4 units downward



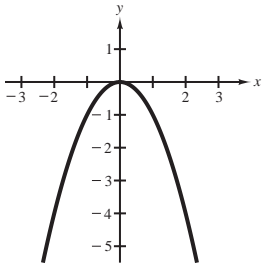
(c) Horizontal shift 2 units to the left



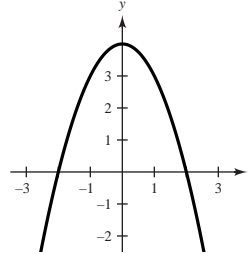
(d) Horizontal shift 4 units to the right



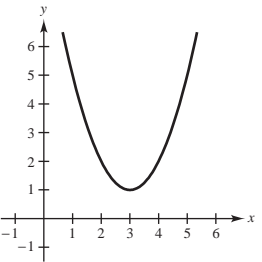
(e) Reflection in the x -axis.



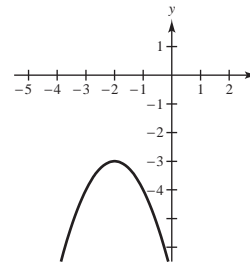
(f) Reflection in the x -axis and a vertical shift 4 units upward



(g) Horizontal shift 3 units to the right and a vertical shift 1 unit upward

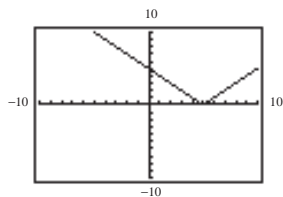


(h) Reflection in the x -axis, a horizontal shift 2 units to the left, and a vertical shift 3 units downward



53. Keystrokes:

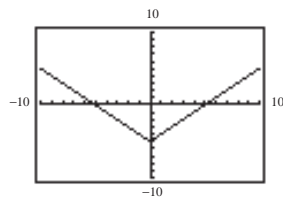
$Y=$ $\boxed{\text{ABS}}$ $\boxed{(}$ $\boxed{X,T,\theta}$ $\boxed{-}$ $\boxed{5}$ $\boxed{)}$ $\boxed{\text{GRAPH}}$



Horizontal shift 5 units to the right

55. Keystrokes:

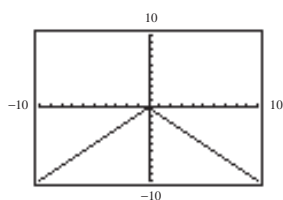
$Y=$ $\boxed{\text{ABS}}$ $\boxed{X,T,\theta}$ $\boxed{-}$ $\boxed{5}$ $\boxed{\text{GRAPH}}$



Vertical shift 5 units downward

57. Keystrokes:

$Y=$ $\boxed{(-)}$ $\boxed{\text{ABS}}$ $\boxed{X,T,\theta}$ $\boxed{\text{GRAPH}}$



Reflection in the x -axis

59. Graph is shifted 3 units left

$$h(x) = (x + 3)^2$$

61. Graph is reflected in the x -axis

$$h(x) = -x^2$$

63. Graph is shifted 3 units left and reflected in the x -axis

$$h(x) = -(x + 3)^2$$

65. Graph is reflected in the x -axis and shifted up 2 units

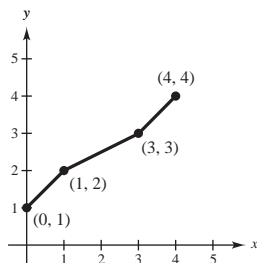
$$h(x) = -x^2 + 2$$

67. $f(x) = -\sqrt{x}$

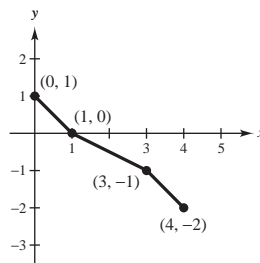
69. $f(x) = \sqrt{x + 2}$

71. $f(x) = \sqrt{-x}$

73. (a) $y = f(x) + 2$



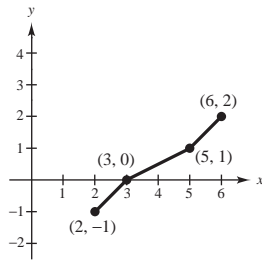
(b) $y = -f(x)$



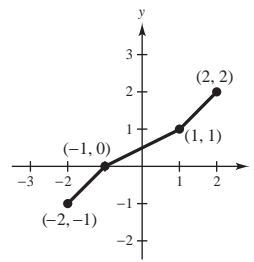
—CONTINUED—

73. —CONTINUED—

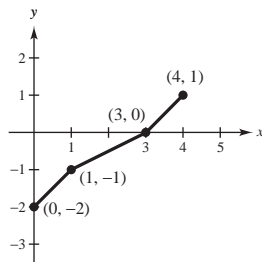
(c) $y = f(x - 2)$



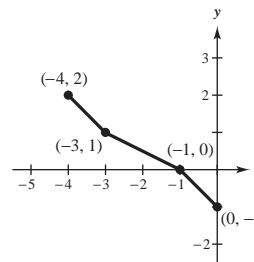
(d) $y = f(x + 2)$



(e) $y = f(x) - 1$

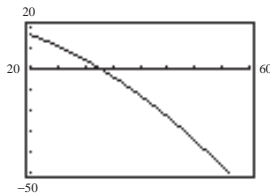


(f) $y = f(-x)$



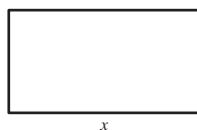
75. (a) Keystrokes:

$Y=$ 26 \square .0242 \square X,T, θ \square x^2 \square \div \square (\square X,T, θ \square \geq 20 \square AND \square X,T, θ \square \leq 60 \square GRAPH



(b) $\approx 46\%$

77. (a)



Let $x =$ length
 $100 - x =$ width

$P = 2l + 2w$

$200 = 2l + 2w$

$100 = l + w$

$100 - l = w$

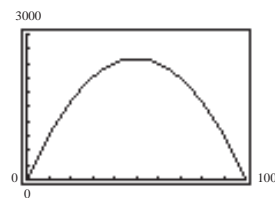
$A = l \cdot w$

$A = x(100 - x)$

Keystrokes:

$Y=$ (\square X,T, θ \square 100 \square - \square X,T, θ \square) GRAPH

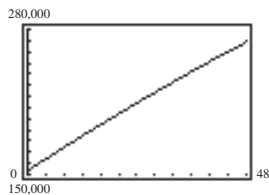
(b)



(c) When $x = 50$, the largest value of A is 2500. (50, 2500) is the highest point on the graph of A giving the largest value of the function.

79. (a) Keystrokes:

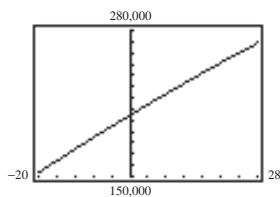
$Y=$ $(-)$ 5.46 (X,T,θ) x^2 $+$ 2665.56 (X,T,θ) $+$ 153,363 $(GRAPH)$



(b) $t = 0$ corresponds to the year 1970 (20 years later).

(c) Keystrokes:

$Y=$ $(-)$ 5.46 (X,T,θ) $+$ 20 (x^2) $+$ 2665.56 (X,T,θ) $+$ 20 $(+)$ 153,363 $(GRAPH)$



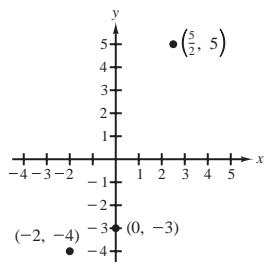
81. If the domain of the function $f(x) = 2x$ changes from $[0, 2]$ to $[0, 4]$, then the range changed from $[0, 4]$ to $[0, 8]$.

83. The four types of shifts of the graph of a function are vertical shift upward, vertical shift downward, horizontal shift to the left, horizontal shift to the right.

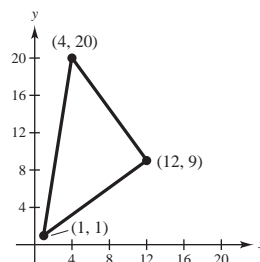
85. $g(x) = f(-x)$ is a reflection in the y-axis of the graph of $f(x)$.

Review Exercises for Chapter 2

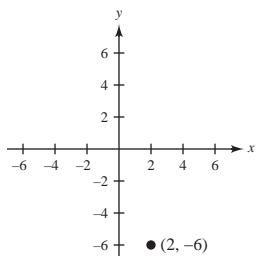
1.



3.



5. Quadrant IV



7. Quadrant I, IV

