Chapter 1 BLM Answers

BLM 1–1 Chapter 1 Prerequisite Skills

1. a) vertex (3, 4), minimum; axis of symmetry $x = 3$; opens upward; domain $\{x \mid x \in \mathrm{R}\}$; range $\{y \mid y \geq 4, y \in \mathrm{R}\}$

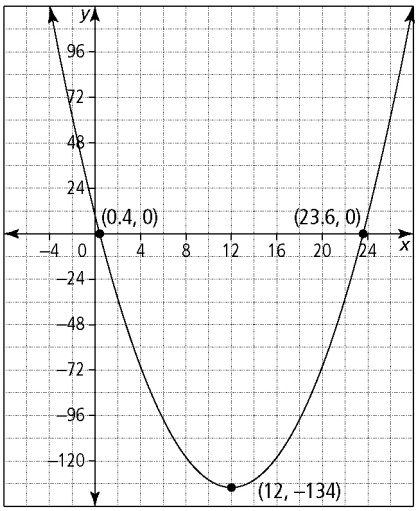
b) vertex (–5,–7), minimum; axis of symmetry $x = -5$; opens upward; domain $\{x \mid x \in \mathrm{R}\}$; range $\{y \mid y \geq -7, y \in \mathrm{R}\}$

c) vertex (0, 15), maximum; axis of symmetry $x = 0$; opens downward; domain $\{x \mid x \in \mathrm{R}\}$; range $\{y \mid y \leq 15, y \in \mathrm{R}\}$

d) vertex $\left(-\frac{1}{2}, -\frac{23}{13}\right)$, maximum; axis of symmetry $x = \frac{1}{2}$; opens downward; domain $\{x \mid x \in \mathrm{R}\}$; range $\left\{y \mid y \leq \frac{-23}{12}, y \in \mathrm{R}\right\}$

2. a) $y = (x - 12)^2 - 134$ **b)** $y = 5(x + 4)^2 - 107$
c) $y = -2(x - 2)^2 + 8$ **d)** $y = -30(x + 1)^2 + 135$

3. a)



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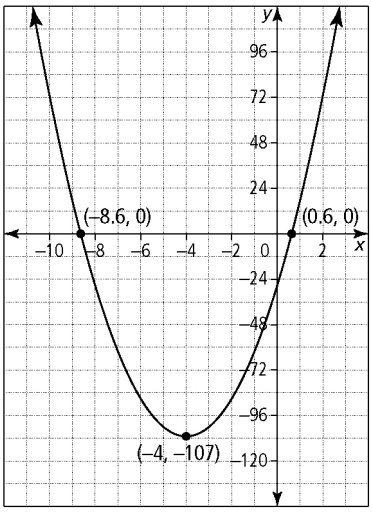
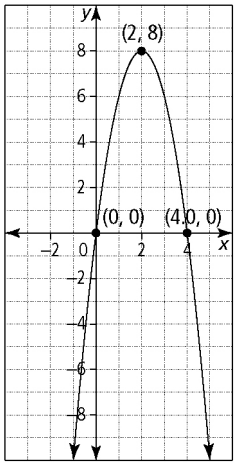
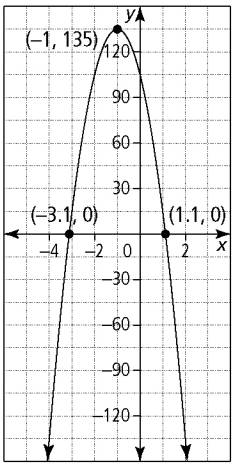


c)

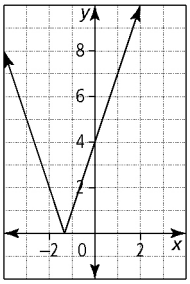


d)

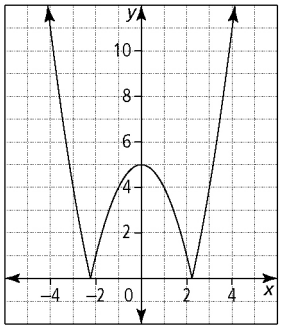


4. a) 7 **b)** 5 **c)** –6 **d)** 9

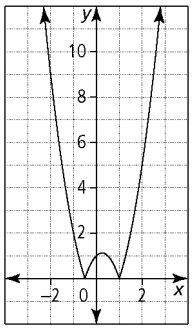
5. a)



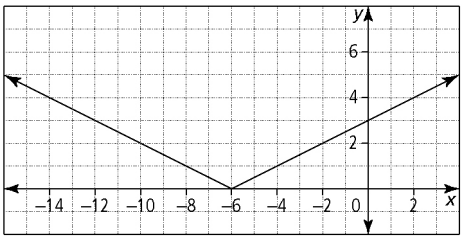
b)



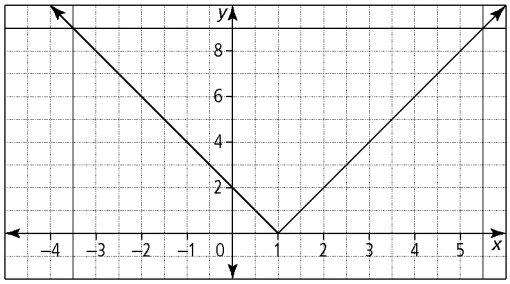
c)



d)

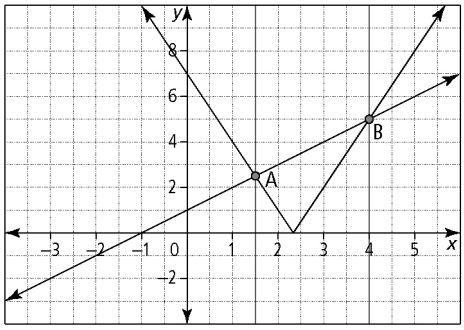


6. a)



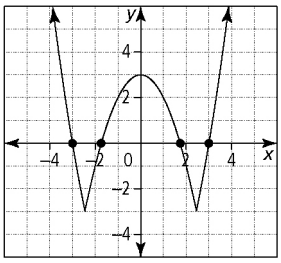
$x = -3.5, 5.5$

b)



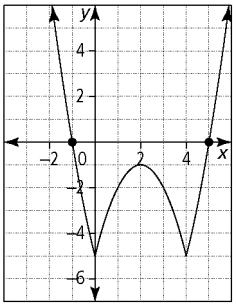
$x = \frac{3}{2}$, $x = 4$

c)



$x = -3, -1.73, 1.73, 3$

d)

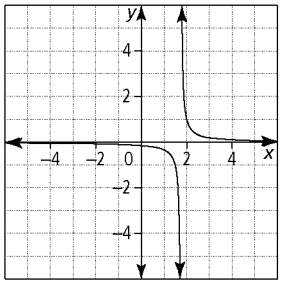


$x = -1, 5$

7. a) $x = -\frac{7}{2}, \frac{11}{2}$ **b)** $x = 1.5, 4$

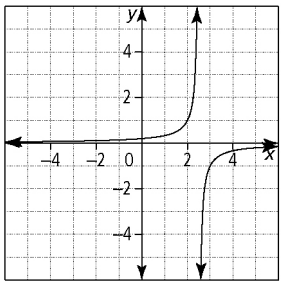
c) $x = -3, \sqrt{3}, -\sqrt{3}, 3$ **d)** $x = -1, 5$

8. a)



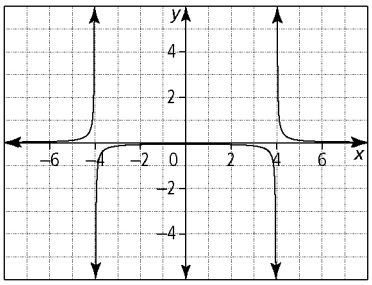
asymptote at $x = \frac{7}{4}$; $x \neq \frac{7}{4}$

b)



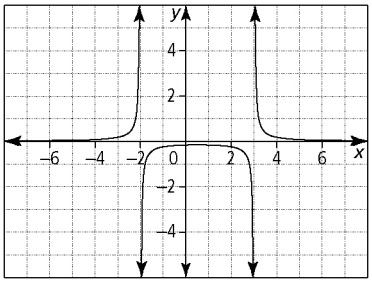
asymptote at $x = \frac{5}{2}$; $x \neq \frac{5}{2}$

c)



asymptotes at $x = 4, -4$; $x \neq \pm 4$

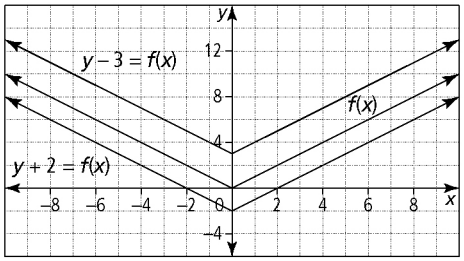
d)



asymptotes at $x = 3, -2$; $x \neq 3, -2$

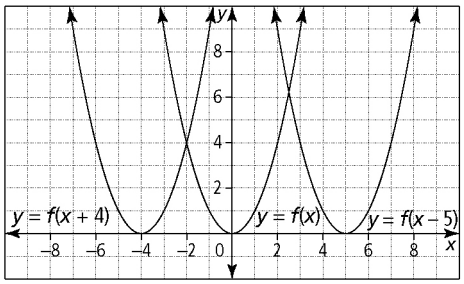
BLM 1–2 Section 1.1 Extra Practice

1. a)



b) $y - 3 = f(x)$ is a translation of $f(x)$ 3 units up;
$y + 2 = f(x)$ is a translation of $f(x)$ 2 units down

2. a)

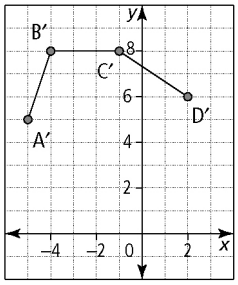


b) $y = f(x + 4)$ is a translation of $f(x)$ 4 units left, and
$y = f(x - 5)$ is a translation of $f(x)$ 5 units right

3. a) $(x, y) \rightarrow (x + 3, y + 6)$ **b)** $(x, y) \rightarrow (x, y - 4)$
c) $(x, y) \rightarrow (x - 2, y + 4)$ **d)** $(x, y) \rightarrow (x + 1, y - 2)$

4. a) translation 2 units left, 3 units up
b) translation 5 units right, 7 units down
c) translation 4 units left
d) translation 6 units up

5. a) A′(–5, 5), B′(–4, 8), C′(–1, 8), D′(2, 6)
b)



6. a) translation left 1 unit, down 4 units
b) $y + 4 = f(x + 1)$

7. a) $k = 2$, $h = -3$; $y - 2 = f(x + 3)^2$
b) $k = -1$, $h = 5$; $y + 1 = f|x - 5|$
c) $k = -5$, $h = 9$; $y + 5 = g(x - 9)$
d) $k = 9$, $h = -4$; $y - 9 = f\left(\frac{1}{x} + 4\right)$

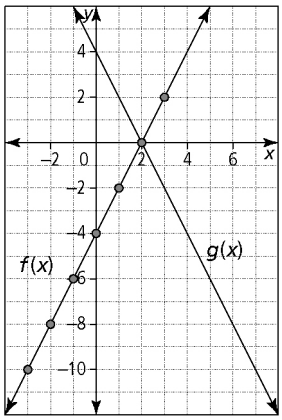
8. 4 units down

BLM 1–3 Section 1.2 Extra Practice

1. a)

x	$f(x)$
–3	–10
–2	–8
–1	–6
0	–4
1	–2
2	0
3	2

b)



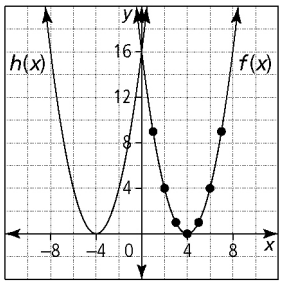
c) $g(x)$ is a reflection of $f(x)$ in the x-axis.

d) (2, 0)

2. a)

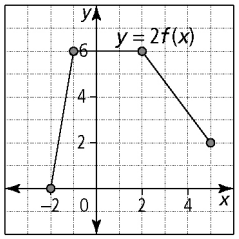
x	$f(x)$
1	9
2	4
3	1
4	0
5	1
6	4
7	9

b)



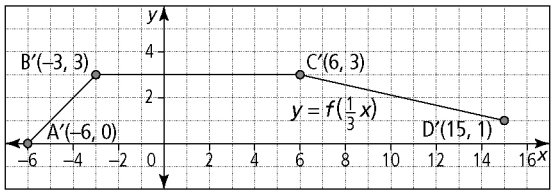
c) $h(x)$ is a reflection of $f(x)$ in the y-axis.
d) (0, 16)

3. a)



b) It is the graph of $y = f(x)$ after a vertical stretch about the x-axis by a factor of 2.
c) A(–2, 0)

4. a)



b) It is the graph of $y = f(x)$ after a horizontal stretch about the y-axis by a factor of 3.
c) (0, 3)
5. a) $(x, y) \rightarrow (x, 3y)$ **b)** $(x, y) \rightarrow (-x, y)$
c) $(x, y) \rightarrow (x, -y)$ **d)** $(x, y) \rightarrow \left(\frac{1}{3}x, y\right)$
6. a) a horizontal stretch about the y-axis by a factor of $\frac{1}{3}$
b) a horizontal stretch about the y-axis by a factor of 4
c) a reflection in the x-axis, a vertical stretch about the x-axis by a factor of $\frac{1}{2}$
d) a reflection in the y-axis, a horizontal stretch about the y-axis by a factor of 2
e) a vertical stretch about the x-axis by a factor of $\frac{1}{4}$
f) a vertical stretch about the x-axis by a factor of 5
7. a reflection in the x-axis, a horizontal stretch about the y-axis by a factor of 3; $h(x) = -f\left(\frac{1}{3}x\right)$
8. The domain of $y = g(x)$ is $\{x \mid -8 \le x \le 16, x \in \mathrm{R}\}$; the range is $\{y \mid -2 \le x \le 4, y \in \mathrm{R}\}$.
9. The domain of $y = g(x)$ is $\{x \mid -4 \le x \le 6, x \in \mathrm{R}\}$; the range is $\{y \mid -12 \le x \le 6, y \in \mathrm{R}\}$.
10. (–15, 0), (12, 0)

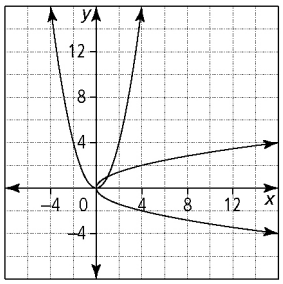
BLM 1–4 Section 1.3 Extra Practice

1. a) B **b)** C **c)** D **d)** A
2. a) $y = 3(-(x + 3))^2 - 2$
b) $y = -\left(\frac{1}{2}x\right)^2 + 7$ **c)** $y = (4(x - 5))^2 - 1$
d) $y = -\frac{1}{3}(2x)^2$
3. a) $y = 2f(-(x + 6))$ **b)** $y = -f(2(x + 5))$
c) $y = -\frac{1}{2}f\left(-3\left(x - 4\right)\right)$ **d)** $y = 4f(-(x - 9))$
4. a) vertically stretched by a factor of 2, horizontally stretched by a factor of $\frac{1}{5}$, translated 3 units right
b) vertically stretched by a factor of $\frac{1}{4}$, reflected in the x-axis, reflected in the y-axis, translated 7 units right
c) horizontally stretched by a factor of $\frac{1}{3}$, translated 4 units left
5. $y = -f\left(\frac{1}{5}(x-3)\right)$
6. a) (–12, 4) **b)** (–3, 24)
c) (–23, –32) **d)** (–36, –12)
7. a) $(a + 7, 0)$; $(0, 3b + 2)$
b) $(-4a, 0)$; $(0, b - 7)$
c) $(a - 10, 0)$; $(0, 4b - 3)$
d) $\left(\frac{a}{2}, 0\right)$; $(0, -b - 6)$

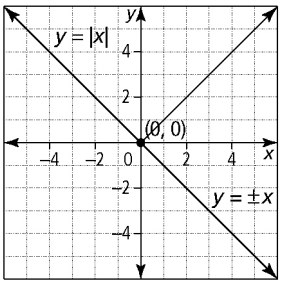
BLM 1–5 Section 1.4 Extra Practice

1. a) interchange the x-coordinate and y-coordinate of the graph or equation
b) $y = f^{-1}(x)$ or $x = f(y)$
c) $(x, y) \rightarrow (y, x)$

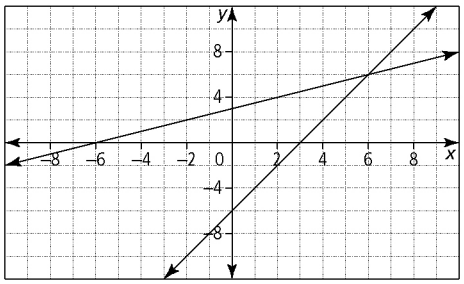
2. a)



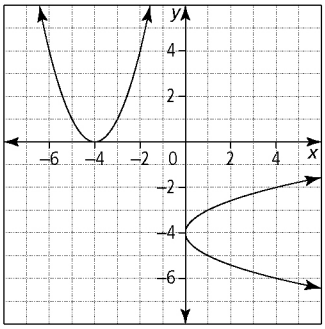
b)



c)



d)

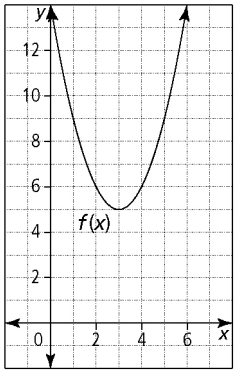


3. a) The inverse of a), b), and d) are not functions. A vertical line intersects the graph of the inverse at more than one point. This means that the relation is not a function.

4. a) $f^{-1}(x) = \frac{1}{3}x + 2$ **b)** $f^{-1}(x) = 2x - 10$

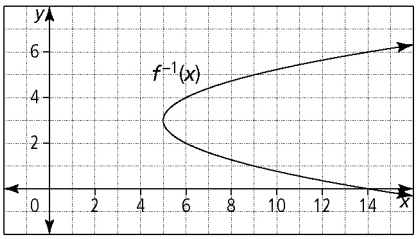
c) $f^{-1}(x) = 3x - 12$ **d)** $f^{-1}(x) = \frac{1}{2}x - \frac{3}{2}$

5. a)



domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq 5, y \in \mathrm{R}\}$

b)



domain: $\{x \mid x \geq 5, x \in \mathrm{R}\}$; range: $\{y \mid y \in \mathrm{R}\}$

c) Restrict the domain to $\{x \mid x \geq 3, x \in \mathrm{R}\}$ or $\{x \mid x \leq 3, x \in \mathrm{R}\}$.

6. a) $f^{-1}(x) = \pm\sqrt{x} - 4$ **b)** $f^{-1}(x) = \pm\sqrt{x+7}$

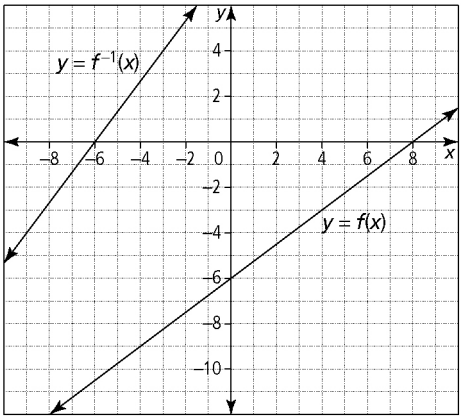
c) $f^{-1}(x) = \pm\sqrt{x-5} + 2$ **d)** $f^{-1}(x) = \pm\sqrt{x+9} + 5$

7. a) $x \geq 0$ or $x \leq 0$ **b)** $x \geq -4$ or $x \leq -4$

c) $x \geq 3$ or $x \leq 3$ **d)** $x \geq 0$ or $x \leq 0$

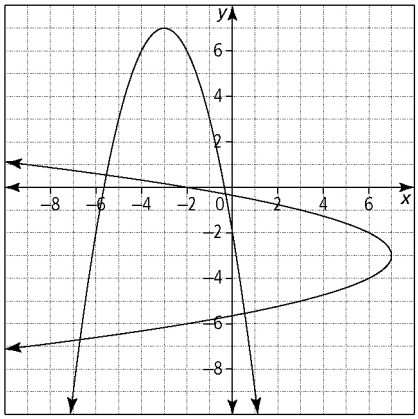
8. a) 12 **b)** 6 **c)** 16 **d)** 8

9. a)



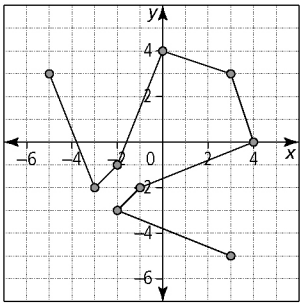
The inverse is a function.

b)



The inverse is not a function.

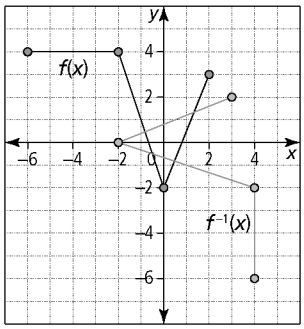
c)



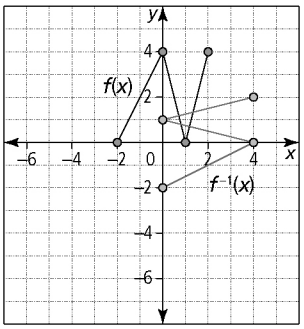
The inverse is not a function.

BLM 1–7 Chapter 1 Test

1. D
2. C
3. A
4. A
5. B
6. A
7. $\{y \mid y \geq 1, y \in \mathrm{R}\}$
8. (0, –20)
9. $y = \frac{1}{3} f(2x)$
10. $k = 3.5$
11. a)



b)

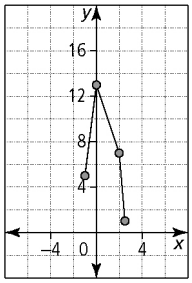


12. a) vertical stretch by a factor of 2 about the x-axis; $g(x) = 2\sqrt{x}$

b) horizontal stretch by a factor of $\frac{1}{4}$ about the y-axis; $g(x) = \sqrt{4x}$

13. a) vertical stretch by a factor of 3 about x-axis, horizontal stretch by a factor of $\frac{1}{2}$ about the y-axis, reflection in the y-axis, horizontal translation 1 unit right, vertical translation 4 units up

b)



14. a) y-intercept = $-6k$; The original y-intercept is multiplied by the value of k.

b) x-intercept = $\frac{-2}{m}, \frac{3}{m}$; The original x-intercept is multiplied by the value of $\frac{1}{m}$.

15. a) $y = (x - 1)^2$ **b)** (0, 1) **c)** $y = 1 \pm \sqrt{x}$
d) $x \leq 1$ or $x \geq 1$