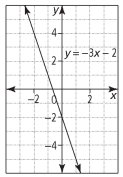
Chapter 7 BLM Answers

BLM 7–2 Chapter 7 Prerequisite Skills

1. a) 7.68 **b)** −3.08 **c)** 1.134 **d)** −5.2

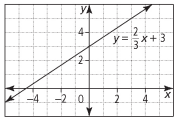
2. a)

x	y
−3	7
−2	4
−1	1
0	−2
1	−5
2	−8
3	−11



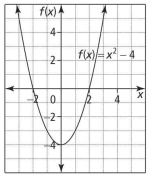
b)

x	y
−3	1
−2	1.67
−1	2.33
0	3
1	3.67
2	4.33
3	5



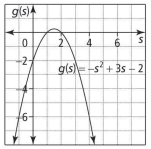
c)

x	f(x)
−3	5
−2	0
−1	−3
0	−4
1	−3
2	0
3	5



d)

s	g(s)
−3	−20
−2	−12
−1	−6
0	−2
1	0
2	0
3	−2



3. a) i) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \in \mathrm{R}\}$
ii) $\left(-\frac{2}{3}, 0\right)$ **iii)** $(0, -2)$ **iv)** none

b) i) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \in \mathrm{R}\}$
ii) $(-4.5, 0)$ **iii)** $(0, 3)$ **iv)** none
c) i) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{f(x) \mid f(x) \geq -4, f(x) \in \mathrm{R}\}$ **ii)** $(-2, 0)$ and $(2, 0)$ **iii)** $(0, -4)$
iv) minimum at $(0, -4)$
d) i) domain: $\{s \mid s \in \mathrm{R}\}$; range: $\{g(s) \mid g(s) \leq 0.25, g(s) \in \mathrm{R}\}$ **ii)** $(1, 0)$ and $(2, 0)$ **iii)** $(0, -2)$
iv) maximum at (1.5, 0.25)

4. a) cannot be simplified, $x \neq -3$

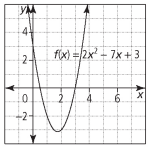
b) $\frac{x-2}{x+2}$, $x \neq \pm 2$ **c)** $-4(x+y)$, $x \neq y$

d) $\frac{(x-2y)(x+2y)^2}{3}$, $x \neq 2y$

5. a) $y = 4x - 19$ **b)** $y = -3x + 7$

c) $y = 2x$ **d)** $y = -\frac{3}{4}x + 3$

6.



a) (1.75, −3.125) **b)** $x = \frac{7}{4}$ or $x = 1.75$

c) upward **d)** minimum value: −3.125

e) domain: $\{x \mid x \in \mathrm{R}\}$;
range: $\{f(x) \mid f(x) \geq -3.125, f(x) \in \mathrm{R}\}$
f) (0.5, 0), (3, 0); (0, 3)

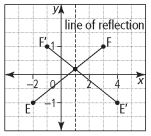
7. a) $(4x - 9)(x - 1)$ **b)** $\frac{1}{2}(x - 4)(x + 1)$

c) $(5p - 2)(p + 3)$ **d)** $(3v + 10)(v + 2)$

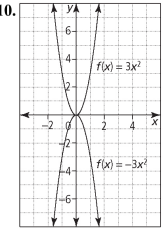
8. a) $x = -\frac{5}{3}$ and $x = 1$ **b)** $x = \frac{2 \pm \sqrt{7}}{3}$

c) $x = -\frac{9}{5}$ **d)** $x = -\frac{1}{2}$ and $x = 3$

9.



10.



11. a) $x \geq 1$ **b)** $x \leq \frac{5}{2}$ **c)** $x \geq 6$ **d)** $x \leq -2$

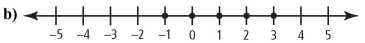
BLM 7–3 Chapter 7 Warm-Up

Section 7.1

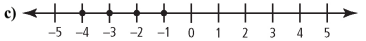
1. a) −7 **b)** 3 **c)** 9 **d)** 3 **e)** 5 **f)** −5

2. a)

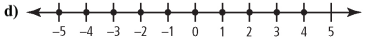
b)



c)



d)



3. a) $-3 \leq x \leq 1$, $x \in \mathrm{I}$ **b)** $x > -1$, $x \in \mathrm{R}$

c) $-2 < x \leq 3$, $x \in \mathrm{R}$ **d)** $x = -1$

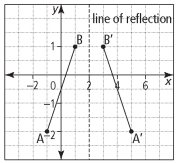
4. a) 0 **b)** 4 units **c)** B and E **d)** $\frac{1}{2}$

5. a) +14 °C **b)** +45 °C **c)** +26 °C **d)** −27 °C

Section 7.2

1. a) −6 **b)** −5 **c)** 5 **d)** 18 **e)** 9

2. a)



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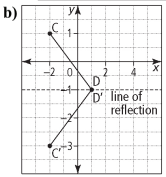
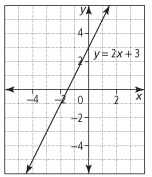
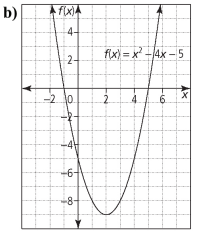


3. a) There is only 1 zero and it is between 0 and 1.
b) domain: $\{-2 \leq x \leq 1, x \in \mathrm{R}\}$;
range: $\{-1 \leq y \leq 1, y \in \mathrm{R}\}$
c) $y = -1$

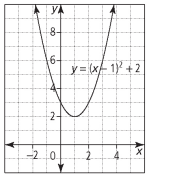
4. a)



b)



c)

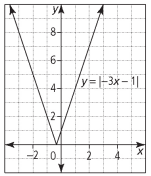


5. a) $y = \frac{3}{2}x - \frac{1}{2}$

b) $y = -(x + 1)^2 + 3$ or $y = -x^2 - 2x + 2$

Section 7.3

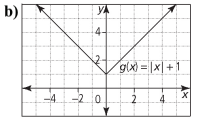
1. a)



y-intercept: (0, 1); x-intercept: $\left(-\frac{1}{3}, 0\right)$;

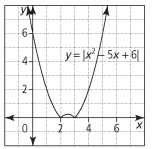
domain: $x \in \mathrm{R}$; range: $y \geq 0$

b)



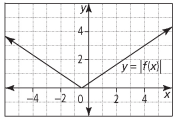
y-intercept: (0, 1); x-intercept: none; domain: $x \in \mathrm{R}$;
range: $y \geq 1$

c)

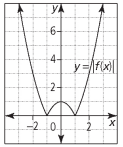


y-intercept: (0, 6); x-intercepts: (2, 0) and (3, 0);
domain: $x \in \mathrm{R}$; range: $y \geq 0$

2. a)



b)



3. a) $x = \frac{5}{2}$ **b)** $x = 3$ **c)** $x = 3$

4. a) $x = \pm 1$ **b)** $x = -3, x = 2$ **c)** $x = -\frac{2}{3},\ x = 1$

5. a) $y = \begin{cases} x - 2, & \text{if } x \geq 2 \\ -x + 2, & \text{if } x < 2 \end{cases}$ **b)** $y = \begin{cases} 2x + 2, & \text{if } x \geq -1 \\ -2x - 2, & \text{if } x < -1 \end{cases}$

Section 7.4

1. a) $-\frac{1}{3}$ **b)** 4 **c)** $\frac{1}{2x}$ **d)** $\frac{x-3}{5x}$

2. a) none **b)** $x \neq 2$ **c)** $x \neq \pm 1$ **d)** $x \neq -2$ and $x \neq -1$

3. a) $x = 3$ and $x = -\frac{5}{3}$; both solutions check

b) $x = 2$ and $x = -4$; both solutions check

c) $x = -5$ and $x = 1$; solution $x = -5$ is extraneous

d) $x = 1$ and $x = 0$; both solutions check

4. a) $y = (x + 1)^2 + 2$ or $y = x^2 + 2x + 3$

b) $y = -x^2 + 2x + 8$ **c)** $y = x^2 - 4x + 4$

5. Let each denominator equal zero and solve the resulting equation. Each solution is a non-permissible value for the rational expression.

BLM 7–4 Section 7.1 Extra Practice

1. a) 42 **b)** $\frac{82}{3}$ **c)** 3.75 **d)** $1\frac{5}{6}$

2. a) $|-3|, |-3.9|, |-4|, |-4.1|, |-4.5|$

b) $-\left|\frac{6}{10}\right|, \left|\frac{6}{25}\right|, \left|-\frac{6}{20}\right|, \left|-\frac{6}{15}\right|, \left|-\frac{6}{5}\right|$

3. a) $|-2.1|, \left|-\frac{5}{3}\right|, \left|-\frac{3}{4}\right|, |-0.6|, -|1.2|$

b) $\left|\frac{46}{2}\right|, \left|-\frac{1}{23}\right|, \left|-\frac{2}{46}\right|, -2\left(\left|\frac{1}{23}\right|\right), -23$

4. a) 14 **b)** 32 **c)** 13 **d)** -2.4

5. a) 16 **b)** -6.25 **c)** $\frac{10}{3}$ **d)** 49

6. a) 8 **b)** 16 **c)** 9 **d)** 8

7. a) 1.5 **b)** 4 **c)** 2 **d)** 3

BLM 7–5 Section 7.2 Extra Practice

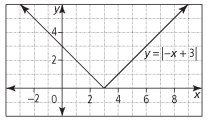
1. a)

x	y
0	1
2	0
4	1
6	2
8	3

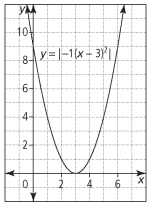
b)

x	y
–4	8
–2	0
0	0
2	8
4	24

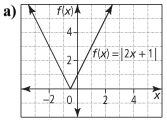
2. a)



b)



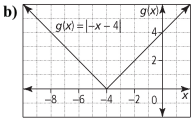
3. a)



x-intercept: $\left(\frac{-1}{2}, 0\right)$; y-intercept: (0, 1);

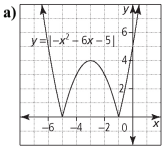
domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

b)



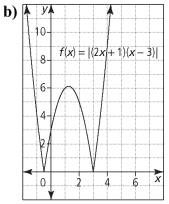
x-intercept: $(-4, 0)$; y-intercept: (0, 4);
domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

4. a)



x-intercepts: $(-5, 0)$ and $(-1, 0)$; y-intercept: (0, 5);
domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

b)



x-intercepts: $\left(\frac{-1}{2}, 0\right)$ and (3, 0); y-intercept: (0, 3);

domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

5. a) $y = \begin{cases} 5x + 1, & \text{if } x \geq -\frac{1}{5} \\ -5x - 1, & \text{if } x < -\frac{1}{5} \end{cases}$

b) $y = \begin{cases} \frac{-1}{2}x + 4, & \text{if } x \leq 8 \\ \frac{1}{2}x - 4, & \text{if } x > 8 \end{cases}$

c) $y = \begin{cases} 2(x+2)^2 - 8, & \text{if } x \leq -4 \text{ or } x \geq 0 \\ -2(x+2)^2 + 8, & \text{if } -4 < x < 0 \end{cases}$

d) $y = \begin{cases} -2(x+3)(x-1), & \text{if } -3 \leq x \leq 1 \\ 2(x+3)(x-1), & \text{if } x < -3 \text{ or } x > 1 \end{cases}$

6. a) $h(x)$ and $k(x)$ **b)** all

c) $g(x)$, $h(x)$, and $k(x)$ **d)** all

7. a) all points where $x \geq 3$ **b)** (0, 0)

c) all points where $-4 \leq x \leq 0$ **d)** all points

BLM 7–6 Section 7.3 Extra Practice

1. a) $x = -3$ or $x = 1$ **b)** no solution

c) $x = \pm\frac{5}{2}$ **d)** $x = 0$

2. a) yes **b)** no **c)** yes **d)** yes

3. a) $x = \frac{1}{4}$ **b)** no solution **c)** $x \geq 5$ **d)** $n = 8$

4. a) $x = 1 \pm \sqrt{2}$ and $x = 1$

b) $x = 4$ and $x = -1$

c) $x = 2$ and $x = -8$

d) $x = 1 \pm \frac{\sqrt{7}}{2},\ x = \frac{1}{2}$, and $x = \frac{3}{2}$

5. a) $x = -5$ or $x = 5$

b) $x = \frac{-3}{2},\ x = -1, x = \frac{-1}{2}$, and $x = 3$

c) $x = 2, 3, 5, 6$ **d)** $x = 1 \pm 2\sqrt{2}$ and $x = 1$

6. a) yes **b)** no **c)** yes **d)** no

7. a) not possible **b)** $k = 0, k > 4$

c) $k = 4$ **d)** $0 < k < 4$

8. Chloe. Mark's solution is incorrect. $0 = (x + 4)(x - 3)$; $x = -4$ or $x = 3$

9. a) Rearrange the equation $|-x^2 + 2| - \frac{x}{2} = 0$ to $|-x^2 + 2| = \frac{x}{2}$. The graph $f(x) = \frac{x}{2}$ is the right side and $g(x) = |-x^2 + 2|$ is the left side. $f(x) = g(x)$ at the points of intersection. The intersection points are the solutions to the equation.

b) The solutions are 1.19 and 1.69.

BLM 7–7 Section 7.4 Extra Practice

1.

	Function	i) Reciprocal	ii) Domain	iii) Range
a)	$y = x + 4$		$\{x \mid x \in \mathrm{R}\}$	$\{y \mid y \in \mathrm{R}\}$
		$y = \frac{1}{x+4}$	$\{x \mid x \neq -4, x \in \mathrm{R}\}$	$\{y \mid y \neq 0, y \in \mathrm{R}\}$
b)	$y = 3x - 9$		$\{x \mid x \in \mathrm{R}\}$	$\{y \mid y \in \mathrm{R}\}$
		$y = \frac{1}{3x-9}$	$\{x \mid x \neq 3, x \in \mathrm{R}\}$	$\{y \mid y \neq 0, y \in \mathrm{R}\}$
c)	$y = (x+2)(x-2)$		$\{x \mid x \in \mathrm{R}\}$	$\{y \mid y \geq -4, y \in \mathrm{R}\}$
		$y = \frac{1}{(x+2)(x-2)}$	$\{x \mid x \neq \pm 2, x \in \mathrm{R}\}$	$\{y \mid y \neq 0, y \in \mathrm{R}\}$
d)	$y = x^2 + 6x + 9$		$\{x \mid x \in \mathrm{R}\}$	$\{y \mid y \geq 0, y \in \mathrm{R}\}$
		$y = \frac{1}{x^2+6x+9}$	$\{x \mid x \neq -3, x \in \mathrm{R}\}$	$\{y \mid y \geq 0, y \in \mathrm{R}\}$

2.

	i) Zeros	ii) Reciprocal	iii) Non-permissible Values	iv) Vertical Asymptote
a)	$x = -3$	$y = \frac{1}{3+x}$	$x \neq -3$	$x = -3$
b)	$x = \frac{1}{2}$	$y = \frac{1}{2x-1}$	$x \neq \frac{1}{2}$	$x = \frac{1}{2}$
c)	$x = -2$ $x = 3$	$y = \frac{1}{(x+2)(x-3)}$	$x \neq -2$ $x \neq 3$	$x = -2$ $x = 3$
d)	$x = -1$ $x = -5$	$y = \frac{1}{-2x^2-12x-10}$	$x \neq -1$ $x \neq -5$	$x = -1$ $x = -5$

3. a) $x = 5$ **b)** $x = \frac{2}{7}$

c) $x = -1$, $x = -0.5$ **d)** $x = -4$, $x = 3$

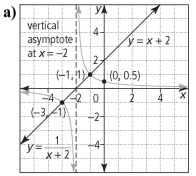
4. There are no x-intercepts, only y-intercepts.

a) $y = \frac{1}{5}$ **b)** $y = \frac{1}{3}$ **c)** $y = \frac{-1}{3}$ **d)** $y = \frac{1}{12}$

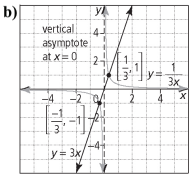
5.

	Reciprocal	Horizontal Asymptote	Vertical Asymptotes	Invariant Points	Intercepts
a)	$y = \frac{1}{x+2}$	$y = 0$	$x = -2$	$(-1, 1)$ and $(-3, -1)$	$y = \frac{1}{2}$
b)	$y = \frac{1}{3x}$	$y = 0$	$x = 0$	$\left(\frac{1}{3}, 1\right)$ and $\left(\frac{-1}{3}, -1\right)$	none
c)	$y = \frac{1}{x^2-9}$	$y = 0$	$x = -3$ $x = 3$	$(3.16, 1)$, $(-3.16, 1)$, $(2.83, -1)$, and $(-2.83, -1)$	$y = \frac{-1}{9}$
d)	$y = \frac{1}{(x+1)^2}$	$y = 0$	$x = -1$	$(-2, 1)$ and $(0, 1)$	$y = 1$

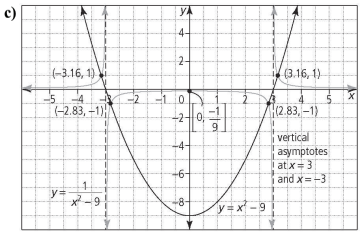
a)



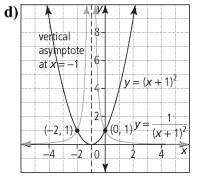
b)



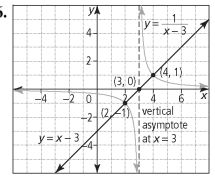
c)



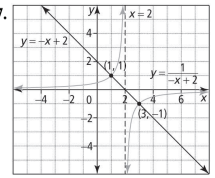
d)



6.



7.



BLM 7–8 Chapter 7 Test

1. C **2.** A **3.** B **4.** C **5.** B **6.** C

7. $|5|$

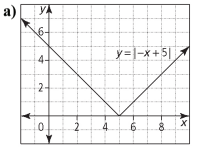
8. $y = \begin{cases} 3x - 4, & \text{if } x \geq \frac{4}{3} \\ -3x + 4, & \text{if } x < \frac{4}{3} \end{cases}$

9. Example: $|x - 5| = 3$

10. $x = 3$

11. $x = -3$ and $x = 2$

12. a)



b) (5, 0)

c) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

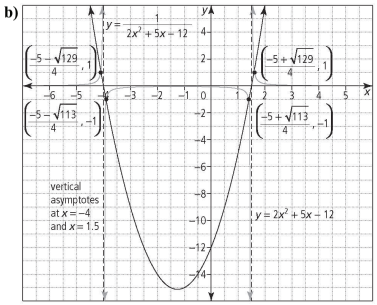
13. a) $|A - 16| = \frac{3}{4}$

b) 15 years and 3 months, or 16 years and 9 months

c) Alain could be older or younger than the average age.

14. a) $x = -4$ and $x = 1.5$

b)



BLM U3–5 Unit 3 Test

1. D **2.** B **3.** A **4.** C
5. 3
6. 300.7
7. 3

8. a) $x \leq -\frac{5}{3}$

b) $x = -2$ or $x = -7$
c) The value $x = -7$ is extraneous.
d) When substituting a value of -7 for x in the original equation, the equality does not hold true.

9. a) $\frac{x+4}{3x+6} = \frac{2x+4}{6x+2}$

b) $x \neq -2$, $x \neq -\frac{1}{3}$; Since the side lengths must be positive, $x \geq -\frac{1}{3}$.

c) $x = 8$

10. a) Isolate the absolute value expression by adding $2x$ to both sides of the equation.

b) $x = -1$ or $x = \frac{1}{3}$

c) Example: When evaluating an absolute value expression, the result is positive. However, a variable within an absolute value symbol can have a negative value.