

# Honors Algebra 2



## Extra Practice Problems

# Contents

<b>1 Equations and Inequalities</b>	<b>2</b>
1.1 Answer Key . . . . .	3
<b>2 Compound Inequalities</b>	<b>4</b>
2.1 Answer Key . . . . .	5
<b>3 Absolute Value Equations and Inequalities</b>	<b>6</b>
3.1 Absolute Value Equations . . . . .	6
3.2 Absolute Value Inequalities . . . . .	6
3.3 Answer Key . . . . .	7
<b>4 Factoring Techniques</b>	<b>8</b>
4.1 Answer Key . . . . .	9
<b>5 The Quadratic Formula</b>	<b>10</b>
5.1 Answer Key . . . . .	11
<b>6 Complex Numbers</b>	<b>12</b>
6.1 Answer Key . . . . .	13
<b>7 Graphs of Quadratic Expressions</b>	<b>14</b>
7.1 Answer Key . . . . .	15
<b>8 Intro to Functions</b>	<b>16</b>
8.1 Answer Key . . . . .	17
<b>9 Operations with Functions</b>	<b>18</b>
9.1 Answer Key . . . . .	19
<b>10 Compositions of Functions</b>	<b>20</b>
<b>11 Function Transformations</b>	<b>22</b>
11.1 Answer Key . . . . .	23
<b>12 Domain and Range</b>	<b>24</b>
12.1 Answer Key . . . . .	25
<b>13 Inverse Functions</b>	<b>26</b>
13.1 Answer Key . . . . .	27
<b>14 Intro to Vectors and Matrices</b>	<b>28</b>
14.1 Answer Key . . . . .	29

# Chapter 1

## Equations and Inequalities

### Equations

Solve each equation. For decimal equations, round your answers to 2 decimal places.

1.  $-7x + 5 = -10x + 11$

2.  $\frac{2}{3}x - 10 = \frac{5}{8}$

3.  $-0.2x - 3(x + 1.4) = -5.2x + 1$

4.  $1.3 + 2.1(6.3x + 12) = -19.7$

5.  $\frac{1}{4}x + \frac{3}{7} = -2\left(x + \frac{3}{8}\right)$

6.  $\frac{1}{3}\left(\frac{2}{5}x - \frac{4}{7}\right) = 3x - 8$

Solve each for the variable indicated.

7.  $F = ma$ ; for  $a$

8.  $PV = nRT$ ; for  $n$

9.  $m = \frac{y_2 - y_1}{x_2 - x_1}$ ; for  $y_2$

10.  $m = \frac{y_2 - y_1}{x_2 - x_1}$ ; for  $y_1$

11.  $v = v_0 + gt$ ; for  $t$

12.  $S = 180(n - 2)$ ; for  $n$

### Inequalities

Solve each inequality. Graph your answers on a number line.

1.  $2(x + 2) \leq 4x - 2(x - 1)$

2.  $-3.2x - 5(x - 1.5) > 7.7 + 1.8x$

## 1.1 Answer Key

### Equations

1.  $x = 2$

4.  $x \approx -3.49$

7.  $a = \frac{F}{m}$

10.  $y_1 = y_2 - m(x_2 - x_1)$

2.  $x = \frac{255}{16}$

5.  $x = -\frac{11}{21}$

8.  $n = \frac{PV}{RT}$

11.  $t = \frac{v-v_0}{g}$

3.  $x = 2.6$

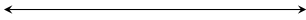
6.  $x = \frac{820}{301}$

9.  $y_2 = m(x_2 - x_1) + y_1$

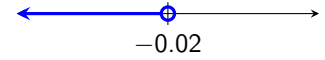
12.  $n = \frac{S}{180} + 2$

### Inequalities

1.  $\emptyset$



2.  $x < -0.02$



## Chapter 2

# Compound Inequalities

Solve each. Graph your answers on a number line.

1.  $-3 < x - 8 \leq 12$

2.  $7 \leq 2x - 5 < 18$

3.  $x + 8 < 10$  or  $5x - 9 \geq 26$

4.  $x - 1.5 > 8$  or  $-x + 2 > 9$

5.  $4 \leq x + 7 < 9$

6.  $-2 < 6x + 10 \leq 5$

7.  $3x > 9$  or  $-5x > 25$

8.  $8x + 12 \leq 20$  or  $x + 12 > 9$

9.  $-8 \leq 3x + 7 < 40$

10.  $-5x + 9 \geq 12$  or  $2x + 6 > 5$

11.  $3x - 1 < x + 5$  or  $-x \geq 5 + 7x$

## 2.1 Answer Key

1.  $5 < x \leq 20$

4.  $x < -7$  or  $x > \frac{19}{2}$

7.  $x < -5$  or  $x > 3$

8.  $\mathbb{R}$

10.  $x \leq -\frac{3}{5}$  or  $x > -\frac{1}{2}$

2.  $6 \leq x < \frac{23}{2}$

5.  $-3 \leq x < 2$

9.  $-5 \leq x < 11$



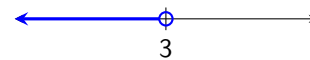
11.

3.  $x < 2$  or  $x \geq 7$

6.  $-2 < x \leq -\frac{5}{6}$



12.  $x < 3$



## Chapter 3

# Absolute Value Equations and Inequalities

### 3.1 Absolute Value Equations

Solve each of the following.

1.  $|2x| = 10$

2.  $|3x - 7| = 8$

3.  $|5x + 1| = -4$

4.  $|x + 7| = 9$

5.  $|8x + 16| = -24$

6.  $|-x - 4| = -3$

7.  $|\frac{1}{2}x + 2| = x - 3$

8.  $|\frac{3}{4}x + 2| = 19$

9.  $-5|-3x + 5| = -30$

### 3.2 Absolute Value Inequalities

Solve each. Graph your answers on a number line.

1.  $|x - 9| < 10$

2.  $|-x + 1| \geq 7$

3.  $|x + 8| < -1$

4.  $|6x - 18| < 42$

5.  $|-2x + 1| \geq 9$

6.  $|5x + 2| < 3x$

7.  $|3x + 2| > 1$

8.  $|2x - 1| \leq 7$

9.  $|2x - 8| \leq 3x$

10.  $3|\frac{1}{3}x + 9| > 27$

11.  $|0.1x + 5.4| < 4.7$

12.  $|2x - 5| \leq 12$

13.  $|3x + 1| > -2x + 2$

14.  $-5|x + 7| < -15$

15.  $|-2x - 5| \geq x + 1$

### 3.3 Answer Key

#### Absolute Value Equations

1.  $x = \pm 5$

4.  $x = 2$  or  $x = -16$

7.  $x = 10$

2.  $x = -\frac{1}{3}$  or  $x = 5$

5.  $\emptyset$

8.  $x = -28$  or  $x = \frac{68}{3}$

3.  $\emptyset$

6.  $\emptyset$

9.  $x = -\frac{1}{3}$  or  $x = \frac{11}{3}$

#### Absolute Value Inequalities

1.  $-1 < x < 19$



2.  $x \leq -6$  or  $x \geq 8$



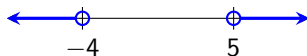
3.  $\emptyset$



4.  $-4 < x < 10$



5.  $x \leq -4$  or  $x \geq 5$



6.  $\emptyset$



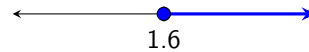
7.  $x < -1$  or  $x > \frac{1}{3}$



8.  $-3 \leq x \leq 4$



9.  $x \geq 1.6$



10.  $x < -54$  or  $x > 0$



11.  $-101 < x < -7$



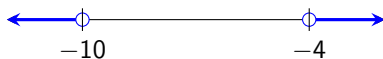
12.  $-3.5 \leq x \leq 8.5$



13.  $x < -3$  or  $x > \frac{1}{5}$



14.  $x < -10$  or  $x > -4$



15.  $x = \mathbb{R}$





## Chapter 4

# Factoring Techniques

Factor each completely.

1.  $x^2 + 2x - 15$

2.  $a^2 - 15a + 56$

3.  $8x^2 + 10x + 3$

4.  $w^2 + w - 12$

5.  $5b^2 - 9b - 2$

6.  $12x^2 + 40x - 7$

7.  $4x^2 - 4x - 24$

8.  $18t^2 - 9t - 5$

9.  $6a^2 + 23a + 21$

10.  $x^2 - 12x + 36$

11.  $9x^2 - 1$

12.  $4x^2 + 4x + 1$

13.  $x^3 - x^2 - 2x$

14.  $6x^2 - 32x + 10$

15.  $2x^3 - 9x^2 - 51x - 40$

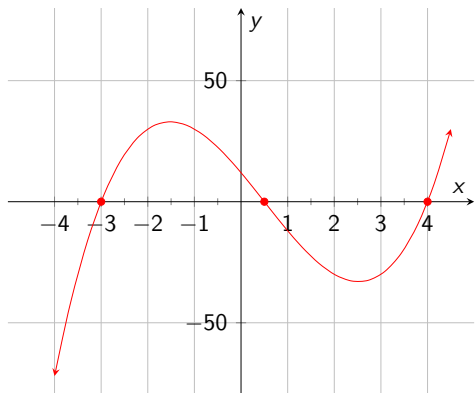
16.  $2x^3 + 3x^2 - 3x - 2$

17.  $4x^3 + 3x^2 - 42x + 40$

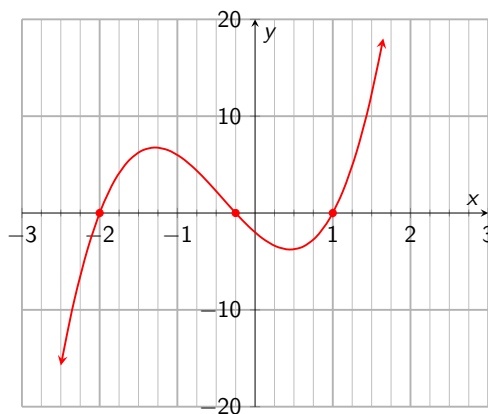
18.  $6x^3 - 27x^2 - 168x$

The graph of a factorable expression is shown below. If the expression is in lowest terms (i.e. there is no number in front of all of the parentheses when it is factored) and contains integer coefficients, write the factored form of the expression.

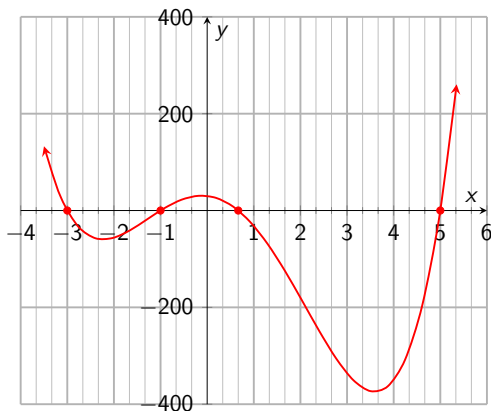
19.



20.



21.



22.

## 4.1 Answer Key

1.  $(x + 5)(x - 3)$
2.  $(a - 8)(a - 7)$
3.  $(4x + 3)(2x + 1)$
4.  $(w + 4)(w - 3)$
5.  $(b - 2)(5b + 1)$
6.  $(2x + 7)(6x - 1)$
7.  $4(x - 3)(x + 2)$
8.  $(3t + 1)(6t - 5)$
9.  $(3a + 7)(2a + 3)$
10.  $(x - 6)^2$
11.  $(3x - 1)(3x + 1)$
12.  $(2x + 1)^2$
13.  $x(x - 2)(x + 1)$
14.  $2(3x - 1)(x - 5)$
15.  $(2x + 5)(x + 1)(x - 8)$
16.  $(x + 2)(2x + 1)(x - 1)$
17.  $(x + 4)(4x - 5)(x - 2)$
18.  $3x(2x + 7)(x - 8)$
19.  $(x + 3)(2x - 1)(x - 4)$
20.  $(x + 2)(4x + 1)(x - 1)$
21.  $(x + 3)(x + 1)(x - 1)(x - 5)$

## Chapter 5

# The Quadratic Formula

Solve each. Exact answers only.

1.  $x^2 - 6x = -2$

2.  $4x^2 + 7x - 1 = 0$

3.  $8x^2 + 4x = 3$

4.  $5x^2 + 6x - 2 = 3x^2 + 10$

5.  $7x^2 - 5 = 6x + 11$

6.  $8x^2 + 2x + 1 = 7x^2 - 8x - 9$

7.  $8x^2 - 2x - 7 = 3x + 1$

8.  $x^4 + 7x^2 - 5 = x^4 + 3x$

9.  $-8x^2 = 3x - 14$

10.  $3x^2 - 5x + 4 = 3$

## 5.1 Answer Key

1.  $x = 3 \pm \sqrt{7}$

2.  $x = \frac{-7 \pm \sqrt{65}}{8}$

3.  $x = \frac{-1 \pm \sqrt{7}}{4}$

4.  $x = \frac{-3 \pm \sqrt{33}}{2}$

5.  $x = -\frac{8}{7}, x = 2$

6.  $x = -5 \pm \sqrt{15}$

7.  $x = \frac{5 \pm \sqrt{281}}{16}$

8.  $x = \frac{3 \pm \sqrt{149}}{14}$

9.  $x = \frac{-3 \pm \sqrt{457}}{16}$

10.  $x = \frac{5 \pm \sqrt{13}}{6}$

## Chapter 6

# Complex Numbers

Simplify each.

1.  $(4 - 7i) + (-2 + 6i)$

2.  $(2 - 4i) - (2 - 3i)$

3.  $6 - (8 + 4i)$

4.  $3(-2 + 7i)$

5.  $(2 + 3i)(-2 - 5i)$

6.  $(4 + 6i)(4 - 6i)$

7.  $\frac{3+i}{2-i}$

8.  $3(7 - 4i) + 2i(1 + 6i)$

9.  $(-2 - 6i)^2$

10.  $\frac{2+3i}{4-5i}$

11.  $(2 + 3i)(-5 + i)$

12.  $(-7 - 5i)^2$

13.  $\frac{3+2i}{8+9i}$

14.  $\frac{-1+5i}{-9-2i}$

15.  $(\frac{2}{5} + \frac{1}{3}i)^2$

Solve each. Exact answers only.

16.  $3x^2 - 7x + 6 = 0$

17.  $5x^2 - 3x + 2 = 0$

18.  $3x^2 + 7x - 4 = 5x^2 + 2x + 5$

## 6.1 Answer Key

1.  $2 - i$
2.  $-i$
3.  $-2 - 4i$
4.  $-6 + 21i$
5.  $11 - 16i$
6. 52
7.  $1 + i$
8.  $9 - 10i$
9.  $-32 + 24i$
10.  $-\frac{7}{41} + \frac{22}{41}i$
11.  $-13 - 13i$
12.  $24 + 70i$
13.  $\frac{42}{145} - \frac{11}{145}i$
14.  $\frac{-1}{85} - \frac{47}{85}i$
15.  $\frac{11}{225} + \frac{4}{15}i$
16.  $x = \frac{7 \pm i\sqrt{23}}{6}$
17.  $x = \frac{3 \pm i\sqrt{31}}{10}$
18.  $x = \frac{5 \pm i\sqrt{47}}{4}$

## Chapter 7

# Graphs of Quadratic Expressions

Identify the vertex and axis of symmetry for each.

1.  $y = 5x^2 - 15x + 7$

2.  $y = x^2 + 8x - 1$

3.  $y = \frac{1}{4}(x + 3)^2 + 1$

Write each of the following in general,  $y = ax^2 + bx + c$ , form.

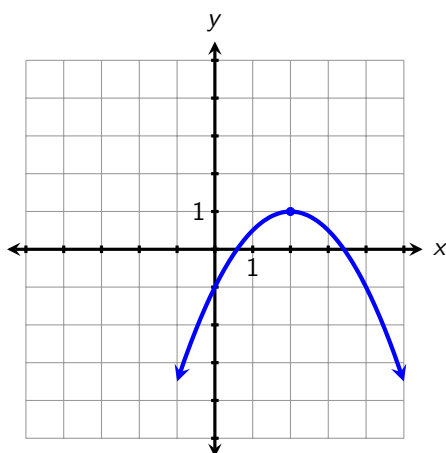
4.  $y = (x - 7)^2 + 4$

5.  $y = -3(x + 2)^2 - 5$

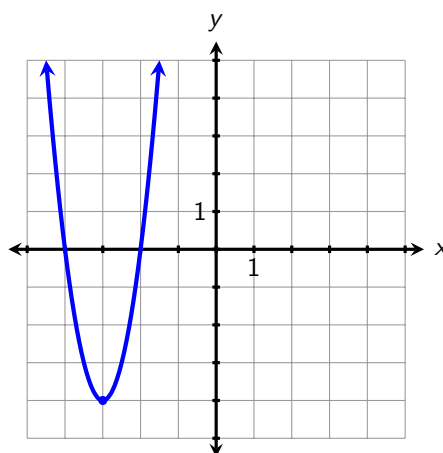
6.  $y = \frac{1}{4}(x - 7)^2 + 1$

Write each of the following in  $y = a(x - h)^2 + k$  and  $y = ax^2 + bx + c$  form.

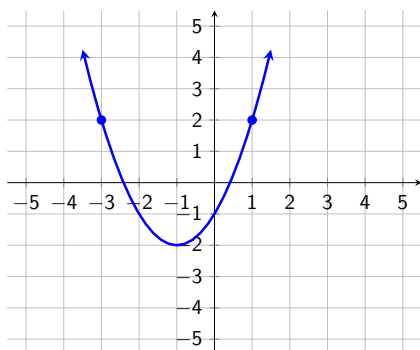
7.



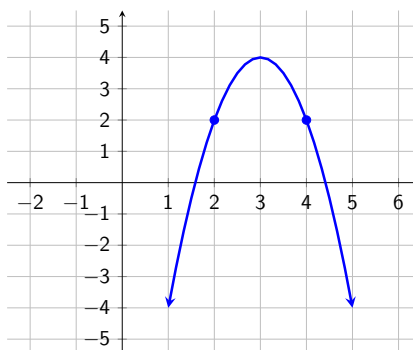
8.



9.



10.



## 7.1 Answer Key

1. Vertex:  $(\frac{3}{2}, -\frac{17}{4})$ ; Axis of Symmetry:  $x = \frac{3}{2}$
2. Vertex:  $(-4, -17)$ ; Axis of Symmetry:  $x = -4$
3. Vertex:  $(-3, 1)$ ; Axis of Symmetry:  $x = -3$
4.  $y = x^2 - 14x + 53$
5.  $y = -3x^2 - 12x - 17$
6.  $y = \frac{1}{4}x^2 - \frac{7}{2}x + \frac{53}{4}$
7.  $y = -\frac{1}{2}(x - 2)^2 + 1 = -\frac{1}{2}x^2 + 2x - 1$
8.  $y = 4(x + 3)^2 - 4 = 4x^2 + 24x + 32$
9.  $y = (x + 1)^2 - 2 = x^2 + 2x - 1$
10.  $y = -2(x - 3)^2 + 4 = -2x^2 + 12x - 14$



## Chapter 8

# Intro to Functions

Evaluate each of the following given  $f(x) = \frac{x}{5} + 8$ .

1.  $f(9)$

2.  $f(-1)$

3.  $f(8)$

Evaluate  $f(x, y) = 3x^2 - \frac{32}{y}$  for each.

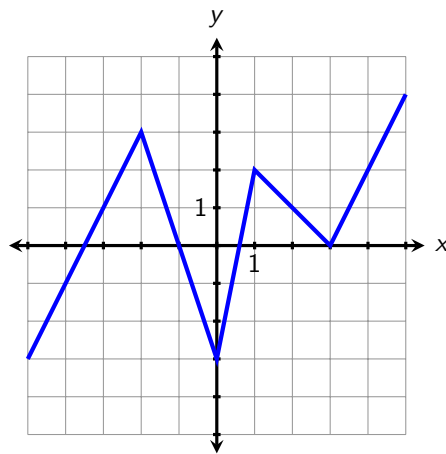
4.  $f(5, 1)$

5.  $f(-2, 2)$

6.  $f(0, 8)$

7.  $f(1, -1)$

Given the graph of  $f(x)$  below, find each of the following.



8.  $f(-5)$

9.  $f(-4)$

10.  $f(-1)$

11.  $f(-2)$

12.  $f(3)$

13.  $f(4)$

14.  $f(2)$

15.  $f(0)$

## 8.1 Answer Key

1.  $\frac{49}{5}$
2.  $\frac{39}{5}$
3.  $\frac{48}{5}$
4. 43
5. -4
6. -4
7. 35
8. -3
9. -1
10. 0
11. 3
12. 0
13. 2
14. 1
15. -3

# Chapter 9

## Operations with Functions

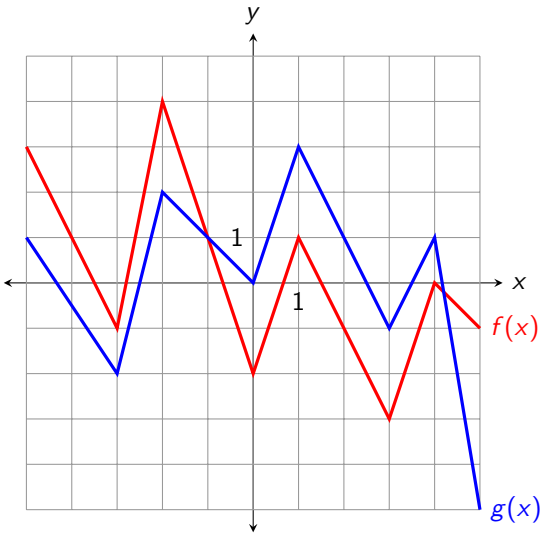
Given  $f(x) = x^2 + 2x - 3$  and  $g(x) = 5x + 2$ , simplify or evaluate each.

1.  $(f + g)(x)$ 
2.  $(f - g)(x)$ 
3.  $(g - f)(x)$ 
4.  $(fg)(x)$
5.  $\left(\frac{f}{g}\right)(x)$ 
6.  $\left(\frac{g}{f}\right)(x)$ 
7.  $(g + f)(7)$ 
8.  $(fg)(0)$

Given  $f(x) = x^2 + 5$  and  $g(x) = -3x - 2$ , find or evaluate each.

9.  $(f + g)(x)$ 
10.  $(fg)(x)$ 
11.  $(f - g)(4)$ 
12.  $\left(\frac{f}{g}\right)(7)$

Given the graph of  $f(x)$  and  $g(x)$ , find each.



13.  $(f + g)(-2)$ 
14.  $(f - g)(1)$ 
15.  $(fg)(3)$ 
16.  $(g - f)(-5)$ 
17.  $\left(\frac{f}{g}\right)(4)$ 
18.  $\left(\frac{g}{f}\right)(-5)$

Find the value of each of the following given the table below.

x	-4	-3	-2	-1	0	1	2	3	4
f(x)	-1	3	1	4	-2	-4	-3	2	0
g(x)	0	-4	1	-3	-2	4	2	-1	3

19.  $(f + g)(1)$ 
20.  $(f - g)(-2)$ 
21.  $(fg)(0)$ 
22.  $\left(\frac{g}{f}\right)(2)$ 
23.  $(g + g)(-3)$

## 9.1 Answer Key

1.  $x^2 + 7x - 1$
2.  $x^2 - 3x - 5$
3.  $-x^2 + 3x + 5$
4.  $5x^3 + 12x^2 - 11x - 6$
5.  $\frac{x^2+2x+3}{5x+2}$
6.  $\frac{5x+2}{x^2+2x+3}$
7. 97
8. -6
9.  $x^2 - 3x + 3$
10.  $-3x^3 - 2x^2 - 15x - 10$
11. 35
12.  $-\frac{54}{23}$
13. 6
14. -2
15. 3
16. -2
17. 0
18.  $\frac{1}{3}$
19. 0
20. 0
21. 4
22.  $-\frac{2}{3}$
23. -8

# Chapter 10

## Compositions of Functions

Given  $f(x) = x^2 + 5$  and  $g(x) = -3x - 2$ , find or evaluate each.

1.  $(f \circ g)(x)$

2.  $(g \circ f)(x)$

3.  $(f \circ f)(x)$

4.  $g(g(x))$

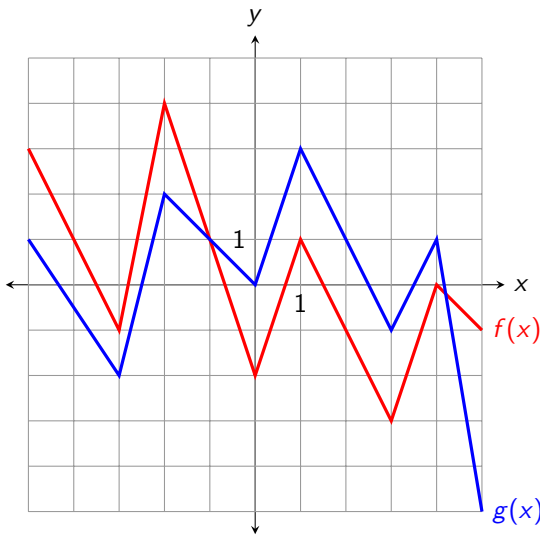
5.  $(f \circ g)(1)$

6.  $(g \circ f)(-2)$

7.  $(f \circ f)(0)$

8.  $g(g(-8))$

Given the graph of  $f(x)$  and  $g(x)$ , find each.



9.  $(f \circ g)(0)$

10.  $(g \circ f)(-5)$

11.  $(f \circ f)(1)$

12.  $(g(g(5)))$

Find the value of each of the following given the table below.

<b>x</b>	<b>-4</b>	<b>-3</b>	<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>f(x)</b>	-1	3	1	4	-2	-4	-3	2	0
<b>g(x)</b>	0	-4	1	-3	-2	4	2	-1	3

13.  $(f \circ g)(1)$

14.  $(g \circ f)(3)$

15.  $(f \circ f)(0)$

16.  $g(g(4))$

17.  $f(g(-1))$

## Answer Key

1.  $9x^2 + 12x + 9$
2.  $-3x^2 - 17$
3.  $x^4 + 10x^2 + 30$
4.  $9x + 4$
5. 30
6. -29
7. 30
8. -68
9. -2
10. -1
11. 1
12. 1
13. 0
14. 2
15. 1
16. -1
17. 3

## Chapter 11

# Function Transformations

For the function  $f(x) = \sqrt{x}$ , write the resulting function  $g(x)$  after the final ordered sequence of transformations.

- |  |  |
|--|--|
| 1. (1) Shift up 3 units<br>(2) Shift right 2 units                         | 2. (1) Shift left 3 units<br>(2) Reflect across $x$ -axis        |
| 3. (1) Vertical compression by factor of 3<br>(2) Reflect across $y$ -axis | 4. (1) Vertical stretch by factor of 4<br>(2) Shift down 7 units |

## 11.1 Answer Key

1.  $g(x) = \sqrt{x-2} + 3$

2.  $g(x) = -\sqrt{x+3}$

3.  $g(x) = \frac{1}{3}\sqrt{-x}$

4.  $g(x) = 4\sqrt{x} - 7$



## Chapter 12

# Domain and Range

State the domain and range of each.

1.  $f(x) = -\frac{1}{4}x - \frac{3}{7}$

2.  $g(x) = \frac{1}{4+x}$

3.  $h(x) = \sqrt{2x+5} - 1$

## 12.1 Answer Key

1. Domain:  $\mathbb{R}$     Range:  $\mathbb{R}$
2. Domain:  $x \neq -4$     Range:  $y \neq 0$
3. Domain:  $x \geq -\frac{5}{2}$     Range:  $y \geq -1$

## Chapter 13

# Inverse Functions

Find the inverse of each function. Then find the domain and range of *both* the given function and its inverse.

1.  $f(x) = \frac{-3}{x-4}$

2.  $g(x) = \sqrt{2x+7} - 1$

3.  $h(x) = \sqrt[3]{x+10} + 6$

## 13.1 Answer Key

1.  $f^{-1}(x) = \frac{-3}{x} + 4$

	Domain	Range
$f(x)$	$x \neq 4$	$y \neq 0$
$f^{-1}(x)$	$x \neq 0$	$y \neq 4$

2.  $g^{-1}(x) = \frac{1}{2}(x+1)^2 - \frac{7}{2}$

	Domain	Range
$g(x)$	$x \geq -3.5$	$y \geq -1$
$g^{-1}(x)$	$x \geq -1$	$y \geq -3.5$

3.  $h^{-1}(x) = (x-6)^3 - 10$

	Domain	Range
$f(x)$	$\mathbb{R}$	$\mathbb{R}$
$f^{-1}(x)$	$\mathbb{R}$	$\mathbb{R}$

## Chapter 14

# Intro to Vectors and Matrices

Given  $\vec{a} = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$  and  $\vec{b} = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$ , find and sketch the result of each.

1.  $\vec{a} + \vec{b}$

2.  $\vec{a} - \vec{b}$

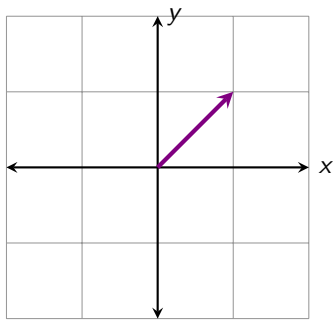
3.  $2\vec{a}$

4.  $3\vec{b}$

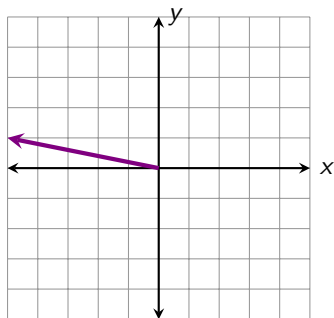
5.  $2\vec{a} + 3\vec{b}$

## 14.1 Answer Key

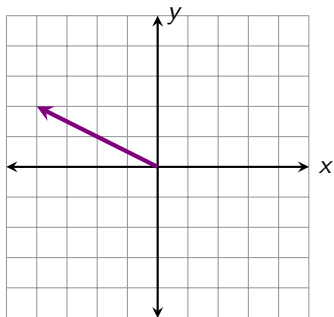
1.  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$



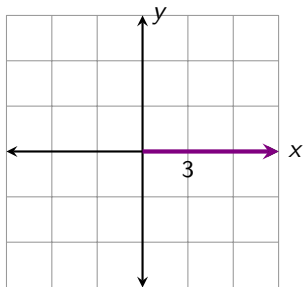
2.  $\begin{bmatrix} -5 \\ 1 \end{bmatrix}$



3.  $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$



4.  $\begin{bmatrix} 9 \\ 0 \end{bmatrix}$



5.  $\begin{bmatrix} 5 \\ 2 \end{bmatrix}$

