

Answers to Exercises

Chapter 1

Exercises 1.2.1

1. 0.75

2. $0.\overline{45}$

3. $0.\overline{285714}$

4. $\frac{41}{333}$

5. (a) $\frac{41152}{333333}$

(b) $\frac{311}{99}$

Exercises 1.3.1

1. $3\frac{4}{5}$

2. $33\frac{1}{3}$

3. $\frac{33}{8}$

4. $\frac{23}{10}$

Exercises 1.5.3

1. $\frac{3}{4}$

2. $\frac{4}{5}$

3. 3

4. $\frac{2}{3}$

5. $\frac{7}{5}$

Exercises 1.6.3

1. $\frac{3}{10}$

2. $\frac{5}{6}$

3. $\frac{34}{3}$

4. 3

5. $\frac{1}{48}$

6. $\frac{1}{8}$

Exercises 1.7.1

1. $\frac{68}{35}$

2. $\frac{1}{6}$

3. $\frac{11}{10}$

4. $\frac{1}{12}$

5. $\frac{13}{3}$

6. $\frac{11}{12}$.

Chapter 2

Exercises 2.3.3

1. -7

2. -7

3. 1.45

4. -14

5. 0

6. $-\frac{13}{20}$

7. $\frac{1}{24}$

8. -3

9. -7

10. -8

11. -1.93

12. -1

13. $\frac{7}{12}$

14. $-\frac{3}{14}$

15. $-\frac{1}{8}$

Exercises 2.4.1

1. -36

2. 25

3. -3

4. 80

5. $-\frac{4}{7}$

6. $\frac{21}{16}$

Exercises 2.5.1

1. 81

2. -8

3. 32

4. -9

5. Not a real number

Chapter 3

Exercises 3.1.1

1. -12

2. 5

3. 2

4. -7

5. $27/16$

6. 5

7. $5/6$

8. 3

Exercises 3.3.2

1. -115

2. 13

3. 1

4. 1875

5. $53/9$

6. (a) 2

(b) -2

(c) 2

(d) -15

(e) $13/5$

7. (a) 3

(b) 3

(c) 2

(d) 1

(e) $-3/2$

8. (a) -40

(b) 5

(c) 50

(d) 77

(e) $448/5$

9. (a) 24

(b) $5/4$

(c) -1

10. (a) -12

(b) -8

(c) 10

Exercises 3.4.1

1. $2(x + 8)$ 2. $\frac{1}{2}x - 7$ 3. $\left(\frac{1}{4}\right)(x - 12)$

4. Thirty less than seven times a number.

5. Three times the sum of a number and two.

6. The sum of three times a number and the square of five less than the same number

7. The quotient of one less than two times a number and three

8. The quotient of three less than seven times a number and three less than the same number

Chapter 4

Exercises 4.1.1

1. Yes.

2. Yes.

3. Yes.

4. No.

5. Yes.

6. No.

7. No.

8. Yes.

9. Yes.

10. No.

11. Yes.

12. Yes.

13. Yes.

14. Yes.

15. No.

Exercises 4.2.6

1. 2

2. $10/3$ 3. -1 4. $1/5$

5. No solution

6. $15/8$

7. All real numbers

8. 0

9. $15/8$

10. 9

11. $14/3$ 12. $5/3$

13. 30, 31, and 32

14. 131 and 133

15. $9/4$ and $51/4$

16. \$ 1,500 per week

17. -1 , 1 and 3.18. $17/4$ and $43/4$

Exercises 4.3.1

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

2. $y = -\frac{5}{4}x + \frac{5}{2}$

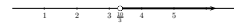
3. $r = \frac{I}{Pt}$

4. $C = \frac{5}{9}(F - 32)$

5. $m = \frac{y_0 - y}{x_0 - x}$

Exercises 4.4.3

1. $3x - 4 > 6$

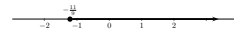


2. $2(x - 3) + 4 \leq x - 5$

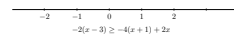


3. $\frac{3(2x-1) + 4(3x+5) > 2(x-6)}{-2}$

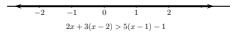
4. $x - 5(2x + 1) \leq 6$



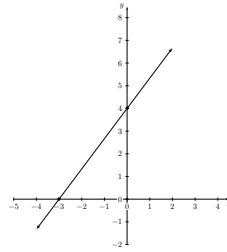
5. No solution



6. All real numbers



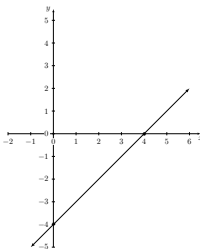
4. $-4x + 3y = 12$



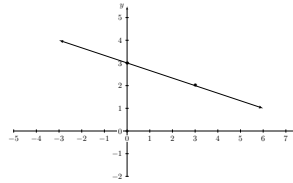
Chapter 5

Exercises 5.1.3

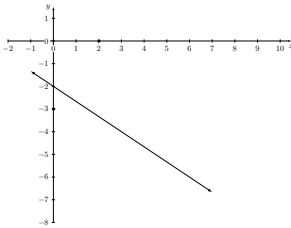
1. $x - y = 4$



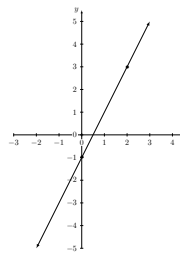
5. $-x + 3y = 9$



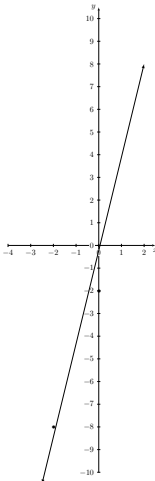
2. $2x + 3y = -6$



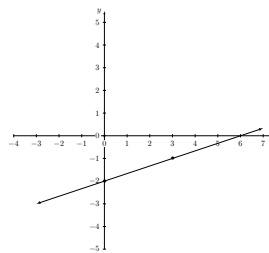
6. $y = 2x - 1$



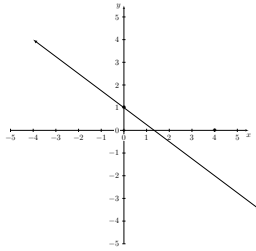
3. $5x - y = 2$



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



8. $y = -\frac{3}{4}x + 1$

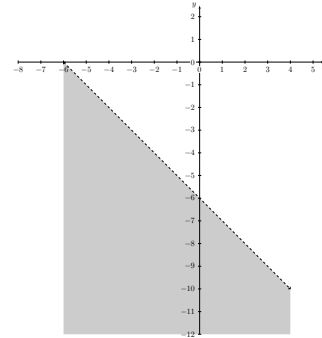


Exercises 5.2.4

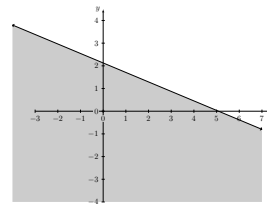
1. (a) -2
 (b) 2
 (c) Undefined
 (d) $1/3$
 (e) $-2/3$
 (f) 5
 (g) 2
 (h) $1/3$
 (i) $-3/4$
 (j) 0
 (k) -1
2. Slope $-3/4$, y-intercept $(0, 1)$
3. Slope 5 , y-intercept $(0, -2)$
4. $y = \frac{3}{4}x - \frac{17}{4}$
5. $y = \frac{2}{3}x - \frac{7}{3}$
6. $y = \frac{3}{4}x - 5$
7. $y = 4x - 4$
8. Find the slopes and compare.
9. $3x + 5y = -9$
10. Find the slopes and use the slope interpretation of perpendicular.
11. $-5x - y = 0$

Exercises 5.3.1

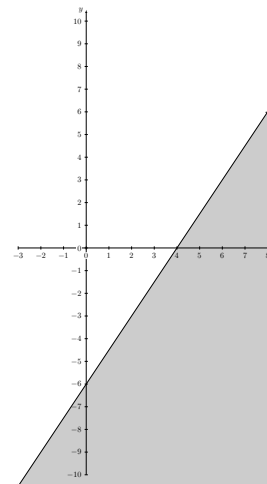
1. $-x - y > 6$



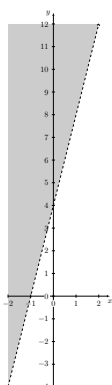
2. $2x + 5y \leq 10$



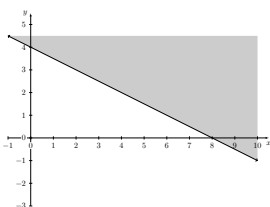
3. $3x - 2y \geq 12$



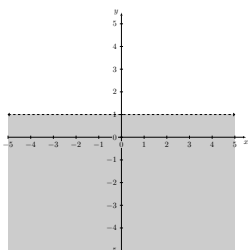
4. $-4x + y > 4$



5. $y \geq -\frac{1}{2}x + 4$



6. $y < 1$



Exercises 5.4.2

1. $(3, -5)$
2. $(-1, -1)$
3. $\left(\frac{15}{8}, -\frac{17}{16}\right)$
4. $\left(\frac{48}{11}, \frac{10}{11}\right)$
5. $(0, 2)$

6. $\left(\frac{13}{7}, \frac{10}{7}\right)$

7. No solution

8. $\left(\frac{14}{3}, \frac{13}{3}\right)$

Chapter 6

Exercises 6.1.1

1. Polynomial
2. Polynomial
3. Polynomial
4. Not polynomial
5. Not polynomial
6. (a)-(b) Terms: 3 (degree 0, coefficient 3), $-x$ (degree 1, coefficient -1); (c)-(d) $-x + 3$ (degree 1)
7. (a)-(b) Terms: 5 (degree 0, coefficient 3), x^2 (degree 2, coefficient 1), $-3x$ (degree 1, coefficient -3); (c)-(d) $x^2 - 3x + 5$ (degree 2)
8. (a)-(b) Terms: 1 (degree 0, coefficient 1), $-x$ (degree 1, coefficient -1), x^2 (degree 2, coefficient 1), $-x^3$ (degree 3, coefficient -1), $x^4/2$ (degree 4, coefficient $1/2$); (c)-(d) $\frac{x^4}{2} - x^3 + x^2 - x + 1$ (degree 4)

Exercises 6.2.3

1. $3x^2 - 3x - 2$
2. $4x^3 - x^2 - x + 7$
3. $4y^2 + 3y + 3$
4. $-3x^3 + 2x^2 - 3x - 3$
5. $4x^3 + 3x^2 - 4x - 3$

6. $-5x + 13$

7. $x^2 + 2x + 6$

Exercises 6.3.2

1. x^7

2. z^{12}

3. $x^{-6}/16$

4. ab

5. x^5y^{-4} or x^5/y^4

6. y

7. (a) 25 (b) 13

8. (a) 1 (b) 5

Exercises 6.4.2

1. 7.5×10^{18}

2. 2.75×10^{-10}

3. 602,200,000,000,000,000,000,000

4. 0.001

5. 1.8×10^8

6. 2×10^{-2}

7. 9.1×10^{-14}

8. 5.1×10^3

9. 7.14×10^3

10. 5×10^{-9}

11. 1.2555×10^1

12. -2.5×10^9

Exercises 6.5.1

1. $x^2 - x - 6$

2. $6x^2 - 11x + 4$

3. $4x^2 + 12x + 9$

4. $x^3 - 1$

5. $x^4 + 6x^3 + 3x^2 - 11x - 6$

6. $x^4 - x^3 - 4x^2 - 11x - 3$

7. $9x^2 - 12x + 4$

8. $8x^3 + 6x^2 - 7x + 6$

9. $2x^3 + 3x^2 - 32x + 30$

10. $8x^3 - 12x^2 + 6x - 1$

11. Distribute.

12. $a = 0$ or $b = 0$.

Exercises 6.6.1

1. $-5x + 10$

2. $\frac{x}{3} - 1 + 3x^{-1}$

3. $x^4 - 4x^3 - 3x$

4. $x^4 - x - 4$

5. $-5x^2 + 7x - 1$

Chapter 7

Exercises 7.2.1

1. $2x(3x^2 - 1)$

2. $4x^2(x^3 - 3x - 2)$

3. $9(2x - 1)$

4. $-3x^2(x^2 - 5x + 3)$

5. $6ab^2(b - 2a)$

6. $-xy(y^3 + 2xy^2 + 15x^4)$

Exercises 7.3.1

1. $(a + 3)(a - 3)$

2. $(x + 5)(x - 5)$

3. Cannot be factored

4. $4(x+3)(x-3)$
 5. $(5x^2+9y^3)(5x^2-9y^3)$
 6. $x^2(x+2)(x-2)$
 7. $3x(x+5)(x-5)$
 8. (a) $(x+y)^2$
 (b) $(x+5)^2$
 (c) $(x+6)^2$
 9. Remember $(a-b)^2 = (a-b)(a-b)$.
 10. (a) $(x-1)^2$
 (b) $(x-9)^2$
 (c) $(x-4)^2$
 11. Combine like terms!
 12. (a) $(x-2)(x^2+2x+4)$
 (b) $y(x-5y)(x^2+5y+25y^2)$
 13. Combine like terms!
 14. (a) $(x+4)(x^2-4x+16)$
 (b) $(2x+3)(4x^2-6x+9)$
- Exercises 7.4.1
1. $(x+4)(x-8)$
 2. $(y+6)(y-3)$
 3. $(x+2)(x+6)$
 4. $(x-2)(x-10)$
 5. Cannot be factored
 6. $(y+2)(y-3)$
 7. $(t+3)^2$
 8. $(x-1)(x-5)$
 9. $3x(x+1)(x-4)$
 10. $5(x+4)(x-4)$
11. $2x(3x^2-1)$
 12. $2(x^2+4)$
 13. $4x(x^2-3x-2)$
 14. $3x(x+2)(x-2)$
 15. (a) $(x^2+2)(x^2+3)$
 (b) $(x^2+3)(x+2)(x-2)$
 (c) $(x^3+4)(x^3-2)$
 (d) $(x^{16}+3)(x^{16}-3)(x^{16}+1)(x^8+1)(x^4+1)(x^2+1)(x+1)(x-1)$
- Exercises 7.5.1
1. $(x+5)(2x-11)$
 2. $(3x+1)(x+1)$
 3. $(3x+2)(2x-1)$
 4. $(5x+2)(3x-1)$
 5. Cannot be factored
 6. $(x+2)(2x-5)$
 7. $2(3x-5)(x-2)$
 8. $2x^2(x-4)(x+2)$
 9. (a) $(2x^2+1)(x^1+3)$
 (b) $(4x^2+5)(x+1)(x-1)$
 (c) $(3x^3-1)(x^3-3)$
 (d) $(2x^3+7)(x^3-1)$
 (e) $(4x^{500}+3)(x^{500}-3)$
 10. (a) $(x+3y)(x-4y)$
 (b) $(x+2y)(x+y)$
 (c) $(2x+y)(x-3y)$
 (d) $(3x+y)(x-y)$
- Exercises 7.6.1
1. $(2z+3w)(3x-4y)$
 2. $(5w+7z)(9c-4d)$
 3. Cannot be factored

4. $(a + 3b)(4c - 3d)$
5. $(5a - 2b)(4x - 3y)$
6. $(3m - 2n)(x + 2y)$

Chapter 8

Exercises 8.2.1

1. $4\sqrt{2}$
2. $10\sqrt{5}$
3. $7\sqrt{2}$
4. $8\sqrt{3}$
5. $5\sqrt{2}$
6. $\frac{\sqrt{3}}{4}$
7. $\frac{2\sqrt{2}}{5}$
8. $\frac{\sqrt{30}}{6}$
9. $\frac{\sqrt{3}}{6}$
10. $\frac{3\sqrt{2}}{8}$
11. (a) 3 and 5
(b) "No n^{th} powers in the radicand."
(c) $2\sqrt[3]{3}$
(d) $\frac{\sqrt[3]{4}}{2}$
(e) $2\sqrt[3]{15}$
12. 10 and -10
13. $2\sqrt{3}$ and $-2\sqrt{3}$
14. $5\sqrt{6}$ and $-5\sqrt{6}$
15. $\sqrt{3}/2$ and $-\sqrt{3}/2$

Exercises 8.3.1

1. $4i$
2. $3i\sqrt{5}$
3. $\frac{i\sqrt{10}}{4}$
4. $i, -1, -i, 1, i, -1, -i, 1, i, -1$
5. $6i$ and $-6i$
6. $2i\sqrt{6}$ and $-2i\sqrt{6}$

Exercises 8.4.1

1. $2\sqrt{2} + 12\sqrt{3}$
2. $-2\sqrt{6} + \sqrt{3}$
3. $12\sqrt{5}$
4. $-2 - 9i$
5. $10\sqrt{2} - \sqrt{5}$
6. $12\sqrt{2} - 10\sqrt{3}$
7. $5\sqrt{2}$
8. $13 + 13i$
9. -1
10. 13
11. $5 - 2\sqrt{6}$
12. $2i$
13. $4\sqrt[3]{2} + 12\sqrt[3]{3}$
14. (a) $\frac{15 - 5\sqrt{2} + 6\sqrt{3} - 2\sqrt{6}}{13}$
(b) $\frac{4\sqrt{2} - \sqrt{10}}{21}$
15. (a) $\frac{11 - 10i}{13}$
(b) $-\frac{9}{37} - \frac{20}{37}i$

16. Read the fine print in the properties of square roots listed in Box 8.1.

Chapter 9

Exercises 9.1.2

1. $5\sqrt{6}$ and $-5\sqrt{6}$
2. $\sqrt{3}/2$ and $-\sqrt{3}/2$
3. $7i$ and $-7i$
4. $3i\sqrt{2}$ and $-3i\sqrt{2}$
5. $5/2$ and $-5/2$
6. $3 + 2\sqrt{3}$ and $3 - 2\sqrt{3}$
7. $13/2$ and $-11/2$
8. $5 + 3i\sqrt{2}$ and $5 - 3i\sqrt{2}$
9. $h = 2\sqrt{13}$
10. $a = 5\sqrt{3}$
11. $h = 4\sqrt{10}$

Exercises 9.2.1

1. -1 and 5
2. -6 and 4
3. $3 + \sqrt{15}$ and $3 - \sqrt{15}$
4. -7 and -3
5. -3 and -2
6. $3 + \sqrt{6}$ and $3 - \sqrt{6}$
7. -3 and 0
8. $3/2$ and -2
9. $-2 + i\sqrt{2}$ and $-2 - i\sqrt{2}$
10. $\frac{2 + \sqrt{7}}{3}$ and $\frac{2 - \sqrt{7}}{3}$

Exercises 9.3.1

Same as previous section.

Exercises 9.4.1

1. 1 and 3
2. -3 and 4
3. -7 and 0
4. -5 and -4
5. $-1/2$ and 2
6. -2 and -1
7. $-5/2$ and $3/2$
8. $-5/3$ and $5/3$
9. (a) $0, 2$ and 4
(b) $-3, -7/2$ and 1
10. (a) 0 and 6 (two solutions)
(b) $3, 5, 9,$ and 11 (four solutions)
(c) 3 (one solution)

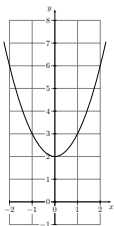
Exercises 9.5.1

1. 2
2. -2 and $1/3$
3. -2 and 0
4. $\frac{1 + \sqrt{5}}{2}$ and $\frac{1 - \sqrt{5}}{2}$
5. $\frac{-3 + i\sqrt{3}}{2}$ and $\frac{-3 - i\sqrt{3}}{2}$
6. -5 and 3
7. $4i$ and $-4i$
8. $-1/2$ and 2
9. $\frac{-5 + \sqrt{71}}{6}$ and $\frac{-5 - \sqrt{71}}{6}$

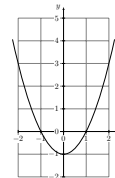
10. $2 + \sqrt{3}$ and $2 - \sqrt{3}$
11. $2i\sqrt{2}$ and $-2i\sqrt{2}$
12. $-1/4$ and 1
13. Width $\frac{-5 + 5\sqrt{97}}{3} \approx 14.748$ ft,
length $5 + 5\sqrt{97} \approx 54.244$ ft.
14. Both legs have length $10 + 10\sqrt{2} \approx 24.142$ units, and the hypotenuse has length $20 + 10\sqrt{2} \approx 34.142$ units.
15. Either 12, 13 and 14, or -3 , -2 and -1 .
16. The perimeter is $\frac{-12 + 6\sqrt{3089}}{5} \approx 64.295$ inches.
17. The object will hit the ground after $5/4 = 1.25$ seconds.
18. The phone will hit the ground after $5/2 = 2.5$ seconds.
19. The segment should be divided into parts having length $-5 + 5\sqrt{5} \approx 6.18$ units and $15 - 5\sqrt{5} \approx 3.82$ units.

Exercises 9.6.1

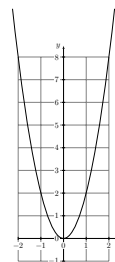
1. $y = x^2 + 2$



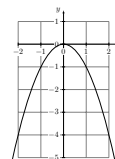
2. $y = x^2 - 1$



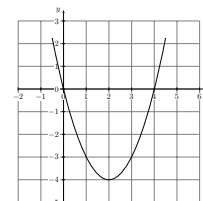
3. $y = 2x^2$



4. $y = -x^2$



5. $y = x^2 - 4x$



6. $y = 1 - x^2$

