Test Bank for College Algebra 13th Lial

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CHAPTER 2, FORM A
COLLEGE ALGEBRA

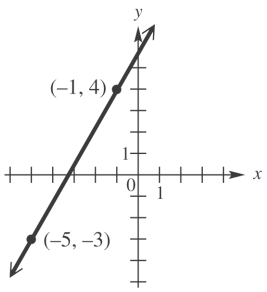
NAME_____
DATE_____

1. Match the set described in Column I with the correct interval notation from Column II. Choices in Column II may be used once, more than once, or not at all.

I	II
a. Domain of $f(x)=\sqrt{x-3}$	**A.** $(-\infty,\infty)$
b. Range of $f(x)=\sqrt{x}-3$	**B.** $[3,\infty)$
c. Domain of $f(x)=x^2-16$	**C.** $[0,2]$
d. Range of $y=2x^2$	**D.** $[0,\infty)$
e. Domain of $f(x)=\sqrt[3]{x-2}$	**E.** $[-3,3]$
f. Range of $f(x)=\sqrt[3]{x}+2$	**F.** $(-\infty,-2]$
g. Domain of $f(x)=\lvert x+2\rvert$	**G.** $[-3,\infty)$
h. Range of $f(x)=\lvert x\rvert+3$	**H.** $[-7,\infty)$
i. Domain of $y=2s^2$	
j. Range of $f(x)=x^2-7$	

1. a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. _____
h. _____
i. _____
j. _____

The graph shows the line that passes through the points (– 5, – 3) and (– 1, 4). Refer to it to answer Exercises 2–6.



2. What is the slope of the line? **2.** _____

3. What is the distance between the two points shown? **3.** _____

4. What are the coordinates of the midpoint of the *segment* joining the two points? **4.** _____

5. Find the standard form of the equation of the line. **5.** _____

6. Write the linear function defined by $f(x)=ax+b$ that has this line as its graph. **6.** _____

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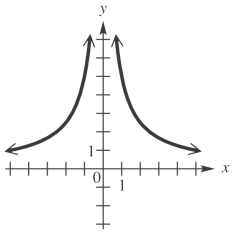
CHAPTER 2, FORM A

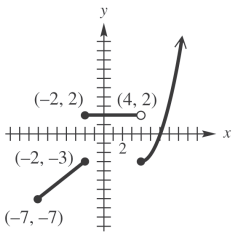
Tell whether each graph is that of a function. Give the domain and the range. If it is a function, give the intervals where it is increasing, decreasing, or constant.

7.



7. _____

8.



8. _____

9. Suppose point P has coordinates $\left(\frac{3}{5}, \frac{4}{7}\right)$.

a. What is the equation of the vertical line through P?

b. What is the equation of the horizontal line through P?

9. a. _____

b. _____

10. Find the slope-intercept form of the equation of the line passing through (2, 5) and

a. parallel to the graph of $y = 4x - 7$;

b. perpendicular to the graph of $y = 4x - 7$.

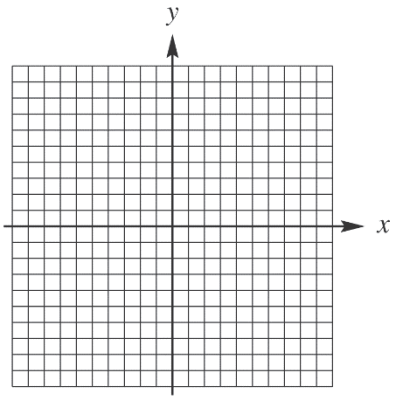
10. a. _____

b. _____

Graph each relation.

11. $x = 2|y - 3| + 1$

11.



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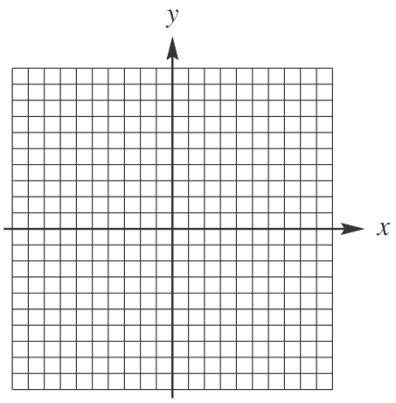
CHAPTER 2, FORM A

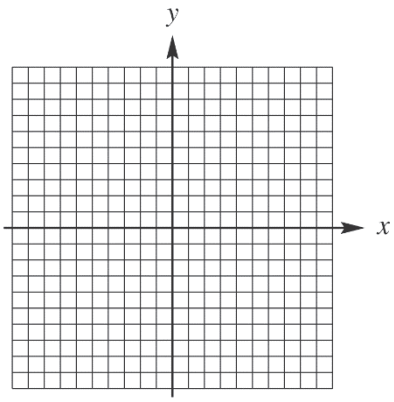
12. $f(x) = [\![x]\!] + 2$

12.



13. $f(x) = \begin{cases} 2x - 1 & \text{if } x < 0 \\ -3x - 1 & \text{if } x \geq 0 \end{cases}$

13.



14. Explain how the graph of $y = -\frac{1}{2}\sqrt{x+3} + 5$ can be obtained from the graph of $y = \sqrt{x}$.

14. _____

15. Determine whether the graph of $2x^2 + 3y^2 = 1$ is symmetric with respect to

a. the x-axis,

b. the y-axis,

c. the origin.

15. **a.** _____

b. _____

c. _____

Given $f(x) = x^2 - 1$ *and* $g(x) = 2x + 1$, *find each of the following. Simplify the expressions when possible.*

16. $(fg)(x)$

16. _____

17. $(f + g)(x)$

17. _____

18. the domain of $\frac{g}{f}$

18. _____

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CHAPTER 2, FORM A

19. $\dfrac{f(x+h)-f(x)}{h}$ **19.** _____

20. $(f-g)(1)$ **20.** _____

21. $\left(\dfrac{f}{g}\right)(2)$ **21.** _____

22. $(f \circ g)(x)$ **22.** _____

23. $(f \circ g)(-2)$ **23.** _____

24. $(g \circ f)(x)$ **24.** _____

25. $(g \circ f)(-2)$ **25.** _____

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CHAPTER 2, FORM B
COLLEGE ALGEBRA

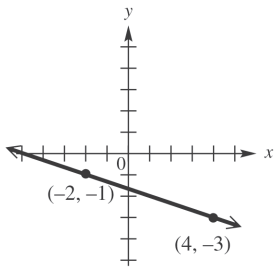
NAME_____
DATE_____

1. Match the set described in Column I with the correct interval notation from Column II. Choices in Column II may be used once, more than once, or not at all.

I	II
a. Domain of $f(x)=\sqrt{x-4}$	**A.** $(-\infty,\infty)$
b. Range of $f(x)=\sqrt{x}-2$	**B.** $[-2,\infty)$
c. Domain of $f(x)=3x^2$	**C.** $[0,2]$
d. Range of $f(x)=x^2+5$	**D.** $[0,\infty)$
e. Domain of $f(x)=\sqrt[3]{x-8}$	**E.** $[-3,3]$
f. Range of $f(x)=\sqrt[3]{x}-1$	**F.** $(-\infty,-2]$
g. Domain of $f(x)=\lvert x-2\rvert$	**G.** $[5,\infty)$
h. Range of $f(x)=\lvert x\rvert+5$	**H.** $[4,\infty)$
i. Domain of $x=2y^2$	
j. Range of $x=2y^2$	

1. a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. _____
h. _____
i. _____
j. _____

The graph shows the line that passes through the points (– 2, – 1) and (4, – 3). Refer to it to answer Exercises 2–6.



2. What is the slope of the line? **2.** _____

3. What is the distance between the two points shown? **3.** _____

4. What are the coordinates of the midpoint of the *segment* joining the two points? **4.** _____

5. Find the standard form of the equation of the line. **5.** _____

6. Write the linear function defined by $f(x)=ax+b$ that has this line as its graph. **6.** _____

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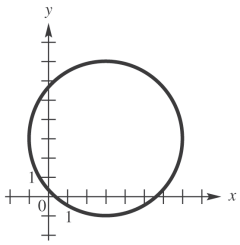
CHAPTER 2, FORM B

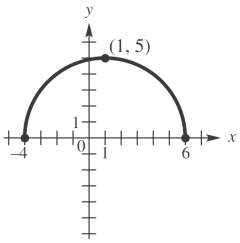
Tell whether each graph is that of a function. Give the domain and the range. If it is a function, give the intervals where it is increasing, decreasing, or constant.

7.



7. _____

8.

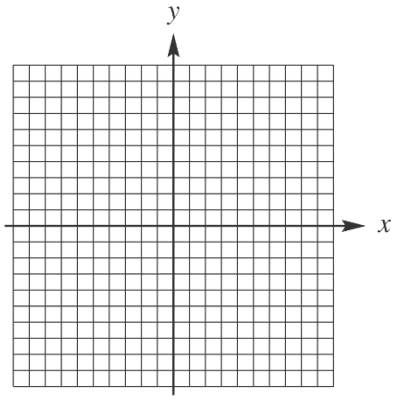


8. _____

Graph each relation.

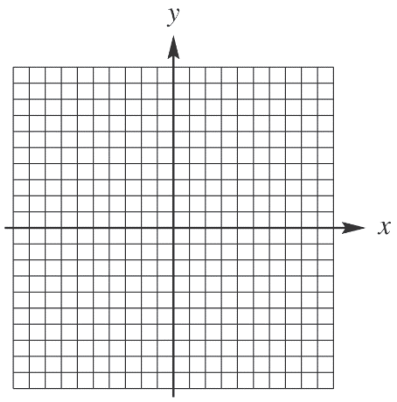
9. $f(x) = 2 - |3x|$

9.



10. $f(x) = \left[\!\left[\frac{1}{2}x\right]\!\right]$

10.



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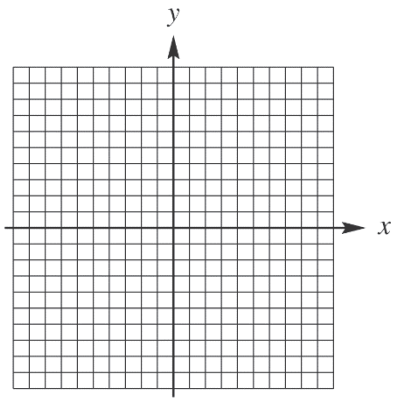
CHAPTER 2, FORM B

11. $f(x)=\begin{cases}-2x & \text{if } x<-3\\ 4 & \text{if } -3\le x\le 2\\ x-4 & \text{if } x\ge 2\end{cases}$

11.



12. Suppose point P has coordinates $\left(-\frac{3}{8},\frac{5}{9}\right)$.

a. What is the equation of the vertical line through P? **12. a.** _____

b. What is the equation of the horizontal line through P? **b.** _____

13. Find the slope-intercept form of the equation of the line passing through $(-6,3)$ and

a. parallel to the graph of $y=-3x-12$; **13. a.** _____

b. perpendicular to the graph of $y=-3x-12$. **b.** _____

14. Explain how the graph of $y=-\frac{1}{3}\sqrt{x+4}+2$ can be obtained from the graph of $y=\sqrt{x}$. **14.** _____

15. Determine whether the graph of $y^2=3x$ is symmetric with respect to **15. a.** _____ **b.** _____ **c.** _____

a. the x-axis,

b. the y-axis,

c. the origin.

Given $f(x)=2x^2+7x+6$ *and* $g(x)=3x-2$, *find each of the following. Simplify the expressions when possible.*

16. $(fg)(x)$ **16.** _____

17. $(f-g)(x)$ **17.** _____

18. the domain of $\frac{g}{f}$ **18.** _____

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CHAPTER 2, FORM B

19. $\dfrac{f(x+h)-f(x)}{h}$ **19.** _____

20. $(f+g)(1)$ **20.** _____

21. $\left(\dfrac{g}{f}\right)(1)$ **21.** _____

22. $(f \circ g)(x)$ **22.** _____

23. $(f \circ g)(0)$ **23.** _____

24. $(g \circ f)(x)$ **24.** _____

25. $(g \circ f)(0)$ **25.** _____

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CHAPTER 2, FORM C
COLLEGE ALGEBRA

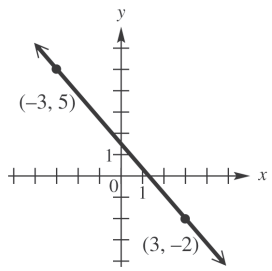
NAME_____
DATE_____

1. Match the set described in Column I with the correct interval notation from Column II. Choices in Column II may be used once, more than once, or not at all.

I	II
a. Domain of $f(x)=\sqrt{x+2}$	**A.** $(-\infty,\infty)$
b. Range of $f(x)=\sqrt{x}-4$	**B.** $[-4,\infty)$
c. Domain of $f(x)=x^2-1$	**C.** $[0,2]$
d. Range of $f(x)=x^2-16$	**D.** $[0,\infty)$
e. Domain of $f(x)=\sqrt[3]{x-2}$	**E.** $[-3,3]$
f. Range of $f(x)=\sqrt[3]{x}+2$	**F.** $(-\infty,-3]$
g. Domain of $f(x)=\lvert x+3\rvert$	**G.** $[-1,\infty)$
h. Range of $f(x)=\lvert x\rvert-3$	**H.** $[-2,\infty)$
i. Domain of $y=2x^2$	
j. Range of $y=x^2-3$	

1. a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. _____
h. _____
i. _____
j. _____

The graph shows the line that passes through the points (– 3, – 5) and (3, – 2). Refer to it to answer Exercises 2–6.



2. What is the slope of the line? **2.** _____

3. What is the distance between the two points shown? **3.** _____

4. What are the coordinates of the midpoint of the *segment* joining the two points? **4.** _____

5. Find the standard form of the equation of the line. **5.** _____

6. Write the linear function defined by $f(x)=ax+b$ that has this line as its graph. **6.** _____

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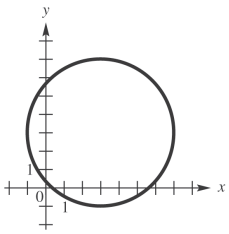
CHAPTER 2, FORM C

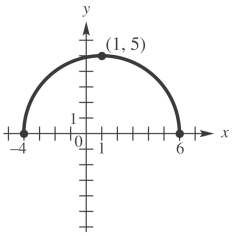
Tell whether each graph is that of a function. Give the domain and the range. If it is a function, give the intervals where it is increasing, decreasing, or constant.

7.



7. _____

8.



8. _____

9. Suppose point P has coordinates $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{5}}{3}\right)$.

a. What is the equation of the vertical line through P?

b. What is the equation of the horizontal line through P?

9. a. _____

b. _____

10. Find the slope-intercept form of the equation of the line passing through $(4, -2)$ and

a. parallel to the graph of $x = \frac{5}{4}y - 2$;

b. perpendicular to the graph of $x = \frac{5}{4}y - 2$;

10. a. _____

b. _____

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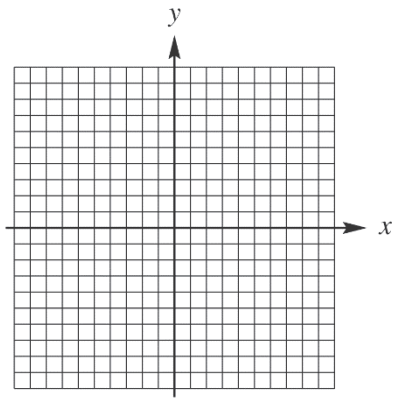
CHAPTER 2, FORM C

Graph each relation.

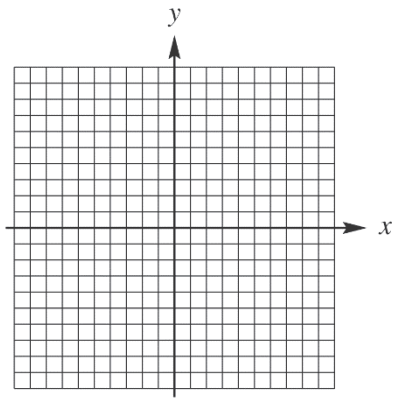
11. $f(x) = \frac{1}{2}|x+1| - 2$

11.



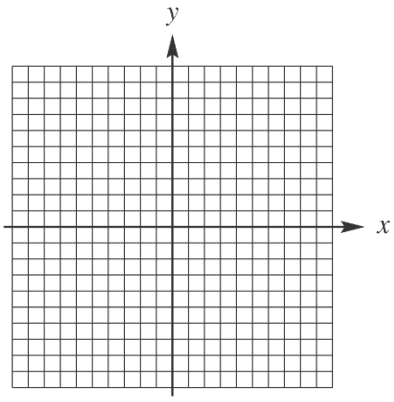
12. $f(x) = [\![2x]\!] - 2$

12.



13. $f(x) = \begin{cases} x+1 & \text{if } x \le -2 \\ -1 & \text{if } x > -2 \end{cases}$

13.



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CHAPTER 2, FORM C

14. Explain how the graph of $y = 3|x+4|+2$ can be obtained from the graph of $y = |x|$. **14.** _____

15. Determine whether the graph of $y = 3x^2 + 7$ is symmetric with respect to **15.** **a.** _____ **b.** _____ **c.** _____

a. the x-axis,

b. the y-axis,

c. the origin.

Given $f(x) = 3x^2 - 2$ *and* $g(x) = 4x + 4$, *find each of the following. Simplify the expressions when possible.*

16. $(fg)(x)$ **16.** _____

17. $(g - f)(x)$ **17.** _____

18. g(–2) **18.** _____

19. $\dfrac{f(x+h) - f(x)}{h}$ **19.** _____

20. $(f + g)(0)$ **20.** _____

21. $\left(\dfrac{f}{g}\right)(-2)$ **21.** _____

22. $(f - g)(x)$ **22.** _____

23. $(f \circ g)(x)$ **23.** _____

24. $(g \circ f)(x)$ **24.** _____

25. $(g \circ f)(1)$ **25.** _____

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CHAPTER 2, FORM D
COLLEGE ALGEBRA

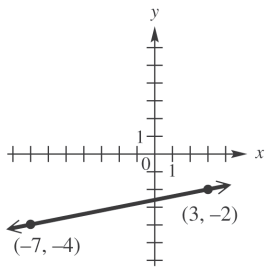
NAME_____
DATE_____

1. Match the set described in Column I with the correct interval notation from Column II. Choices in Column II may be used once, more than once, or not at all.

I	II
a. Domain of $f(x)=\sqrt{x+1}$	**A.** $(-\infty,-1]$
b. Range of $f(x)=\sqrt{x}+1$	**B.** $(-\infty,\infty)$
c. Domain of $f(x)=x^2-25$	**C.** $[0,2]$
d. Range of $f(x)=x^2-1$	**D.** $[0,\infty)$
e. Domain of $f(x)=\sqrt[3]{x-2}$	**E.** $[-3,3]$
f. Range of $f(x)=\sqrt[3]{x}+2$	**F.** $[-3,\infty)$
g. Domain of $f(x)=\lvert x+4\rvert$	**G.** $[-1,\infty)$
h. Range of $f(x)=\lvert x\rvert-4$	**H.** $[-4,\infty)$
i. Domain of $y=2x^2$	
j. Range of $y=x^2-4$	

1. a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. _____
h. _____
i. _____
j. _____

The graph shows the line that passes through the points (– 7, – 4) and (3, – 2). Refer to it to answer Exercises 2–6.



2. What is the slope of the line? **2.** _____

3. What is the distance between the two points shown? **3.** _____

4. What are the coordinates of the midpoint of the *segment* joining the two points? **4.** _____

5. Find the standard form of the equation of the line. **5.** _____

6. Write the linear function defined by $f(x)=ax+b$ that has this line as its graph. **6.** _____

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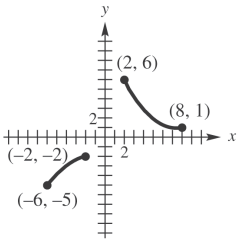
CHAPTER 2, FORM D

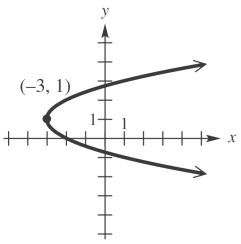
Tell whether each graph is that of a function. Give the domain and the range. If it is a function, give the intervals where it is increasing, decreasing, or constant.

7.



7. _____

8.

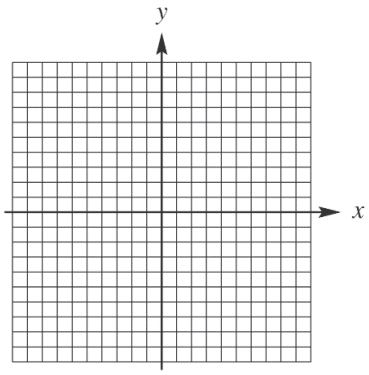


8. _____

Graph each relation.

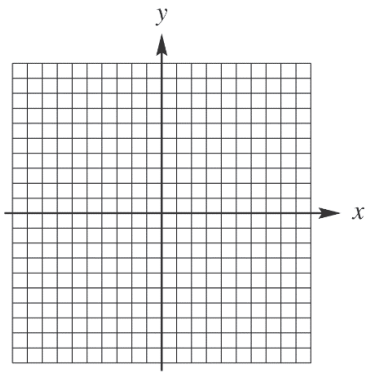
9. $f(x) = 3 + |x + 1|$

9.



10. $f(x) = \begin{cases} -x \text{ if } x < 0 \\ 2x \text{ if } x \geq 0 \end{cases}$

10.



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CHAPTER 2, FORM D

11. Suppose point P has coordinates $(-\pi, 0.15)$.

a. What is the equation of the vertical line through P? **11. a.** _____

b. What is the equation of the horizontal line through P? **b.** _____

12. Find the slope-intercept form of the equation of the line passing through $(1, -5)$ and

a. parallel to the graph of $x = -\frac{3}{4}y + 5$; **12. a.** _____

b. perpendicular to the graph of $x = -\frac{3}{4}y + 5$; **b.** _____

13. Find the slope of the line through points $(11, -5)$ and $(-8, 6)$. **13.** _____

from the graph of $y = \sqrt{x}$.

14. Explain how the graph of $y = 3\sqrt{x-4} - 2$ can be obtained **14.** _____

from the graph of $y = \sqrt{x}$.

15. Determine whether the graph of $xy = -4$ is symmetric **15. a.** _____

with respect to **b.** _____

a. the x-axis, **c.** _____

b. the y-axis,

c. the origin.

Given $f(x) = 2x^3 - 3x - 1$ *and* $g(x) = 2x + 1$, *find each of the following. Simplify the expressions when possible.*

16. $(f+g)(x)$ **16.** _____

17. $\left(\frac{f}{g}\right)(x)$ **17.** _____

18. $g(-1)$ **18.** _____

19. $\frac{f(x+h) - f(x)}{h}$ **19.** _____

20. $(g-f)(0)$ **20.** _____

21. $(fg)(-1)$ **21.** _____

22. $(f \circ g)(x)$ **22.** _____

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CHAPTER 2, FORM D

23. $(f \circ g)(1)$ **23.** _____

24. $(g \circ f)(x)$ **24.** _____

25. $(g \circ f)(1)$ **25.** _____

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CHAPTER 2, FORM E
COLLEGE ALGEBRA

NAME_____
DATE_____

Choose the best answer.

1a. Which of the following is the domain of $f(x) = \sqrt{3} - x$? **1a.** _____

a. $[0, 3]$ **b.** $(-\infty, 3]$

c. $[3, \infty)$ **d.** $(-\infty, \infty)$

1b. Which of the following is the range of $f(x) = x^2 - 49$? **1b.** _____

a. $[-49, \infty)$ **b.** $[-7, \infty)$

c. $[-7, 7]$ **d.** $[0, \infty)$

1c. Which of the following is the domain of $f(x) = \sqrt[3]{x+7}$? **1c.** _____

a. $(-\infty, \infty)$ **b.** $(-\infty, 6]$

c. $[0, \infty)$ **d.** $[6, \infty)$

1d. Which of the following is the range of $f(x) = |x| + 1$? **1d.** _____

a. $[-1, 1]$ **b.** $[0, 1]$

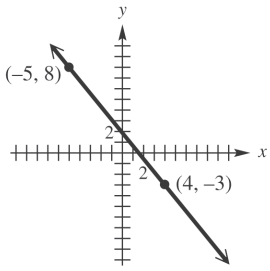
c. $[0, \infty)$ **d.** $[1, \infty)$

1e. Which of the following is the domain of $x = y^2$? **1e.** _____

a. $(-\infty, \infty)$ **b.** $[0, \infty)$

c. $(0, \infty)$ **d.** $(-\infty, 0]$

The graph shows the line that passes through $(-5, 8)$ *and* $(4, -3)$. *Refer to it to answer Exercises 2-6.*



2. What is the slope of the line? **2.** _____

a. $-\frac{13}{7}$ **b.** $\frac{11}{9}$

c. $-\frac{11}{9}$ **d.** 0

3. What is the distance between the two points shown? **3.** _____

a. $\sqrt{26}$ **b.** $2\sqrt{5}$

c. $\sqrt{202}$ **d.** $\sqrt{122}$

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CHAPTER 2, FORM E

4. What are the coordinates of the midpoint of the segment joining the two points? **4.** _____

a. $\left(-\frac{1}{2}, \frac{5}{2}\right)$ **b.** $\left(-\frac{9}{2}, \frac{11}{2}\right)$

c. $\left(\frac{3}{2}, \frac{1}{2}\right)$ **d.** $(-1, 5)$

5. Find the standard form of the equation of the line. **5.** _____

a. $11x + 9y = 127$ **b.** $11x - 9y = 17$

c. $11x + 9y = 17$ **d.** $11x - 9y = 127$

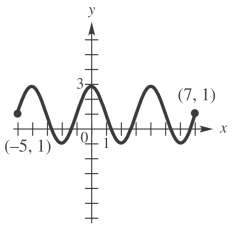
6. Find the standard form of the equation of the line. **6.** _____

a. $f(x) = \frac{11}{9}x - \frac{17}{9}$ **b.** $f(x) = -\frac{11}{9}x + \frac{17}{9}$

c. $f(x) = \frac{11}{9}x + \frac{127}{9}$ **d.** $f(x) = \frac{11}{9}x - \frac{127}{9}$

Tell whether each graph is that of a function. Give the domain and range.

7. **7.** _____



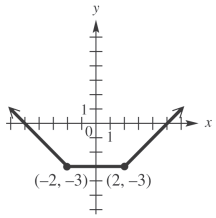
a. Function; domain: $[-5, 7]$; range: $[-1, 3]$

b. Function; domain: $(-\infty, \infty)$; range: $[-1, 3]$

c. Function; domain: $[-1, 3]$; range: $[-5, 7]$

d. Not a function; domain: $[-5, 7]$; range: $[-1, 3]$

8. **8.** _____



a. Not a function; domain: $(-\infty, \infty)$; range: $[-2, \infty)$

b. Not a function; domain: $[-5, 5]$; range: $[-3, \infty)$

c. Function; domain: $(-\infty, \infty)$; range: $[-2, \infty)$

d. Function; domain: $(-\infty, \infty)$; range: $[-3, \infty)$

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CHAPTER 2, FORM E

9. Suppose point P has coordinates $(-6,1)$. **9.** _____
What is the equation of the vertical line through P?

a. $x=-6$ **b.** $y=1$
c. $x=1$ **d.** $y=6$

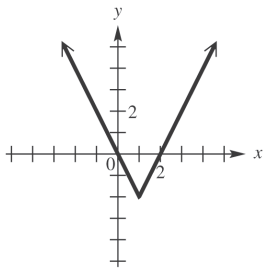
10. Find the slope-intercept form of the equation of the line passing. **10.** _____
through $(-2,5)$ perpendicular to the graph of $y=-\frac{1}{8}x+\frac{19}{4}$.

a. $y=8x+21$ **b.** $y=\frac{1}{3}x-3$
c. $y=-8x-13$ **d.** $y=-\frac{1}{3}x+3$

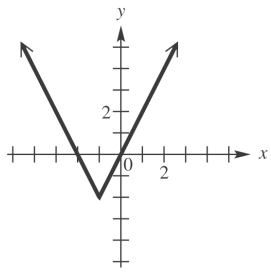
Graph each function.

11. $f(x)=2|x-1|-2$ **11.** _____

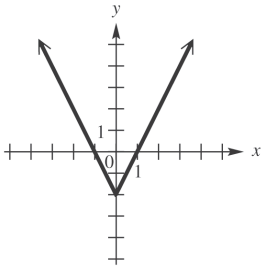
a.



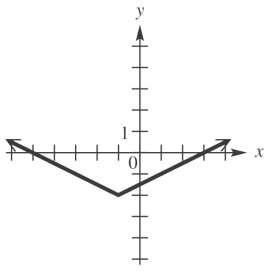
b.



c.



d.



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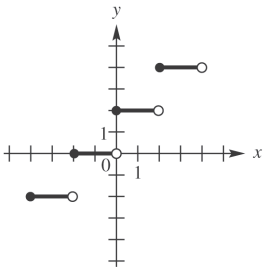
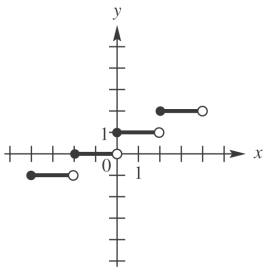
12. $f(x) = \left\lfloor\left\lfloor \frac{1}{2}x \right\rfloor\right\rfloor$ **12.** _____

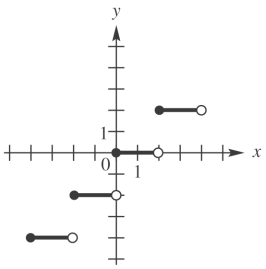
a.



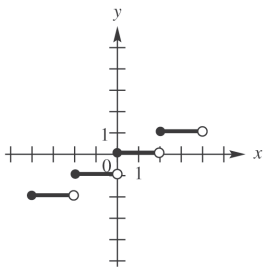
b.



c.

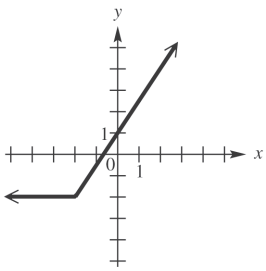


d.

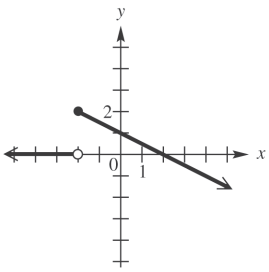


13. $f(x) = \begin{cases} 2 & \text{if } x < -2 \\ -\frac{1}{2}x + 1 & \text{if } x \geq -2 \end{cases}$ **13.** _____

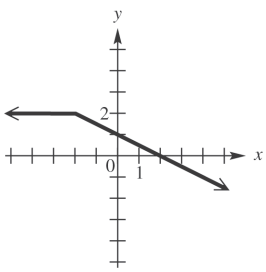
a.



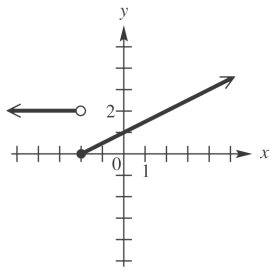
b.



c.



d.



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CHAPTER 2, FORM E

14. Explain how the graph of $y = \sqrt{x+2} - 5$ can be obtained from the graph of $y = \sqrt{x}$. **14.** _____

a. Translate 2 unit to the right and 5 units up.
b. Translate 2 unit to the right and 5 units down.
c. Translate 2 unit to the left and 5 units up.
d. Translate 2 unit to the left and 5 units down.

15. Determine the symmetries of the graph of the relation $x^2 - 2xy + y^2 = 5$. **15.** _____

a. x-axis only **b.** y-axis only
c. origin only **d.** x-axis, y-axis, and origin

Given $f(x) = 5x - 4$ *and* $g(x) = x^2 + 3$, *find each of the following. Simplify the expressions when possible.*

16. $(fg)(x)$ **16.** _____

a. $x^3 + 4x^2 - 12$ **b.** $5x^3 - 4x^2 + 15x - 12$
c. $5x^3 + 4x^2 + 3x - 12$ **d.** $-5x^3 + 4x^2 - 5x - 12$

17. $(g - f)(x)$ **17.** _____

a. $x^2 - 5x + 7$ **b.** $x^2 + 5x - 7$
c. $-x^2 - 5x + 1$ **d.** $x^2 + 5x + 1$

18. The domain of $\frac{g}{f}$ **18.** _____

a. $\left(-\infty, \frac{4}{5}\right) \cup \left(\frac{4}{5}, \infty\right)$ **b.** $\left(-\infty, \frac{5}{4}\right) \cup \left(\frac{5}{4}, \infty\right)$
c. $\left(-\infty, \frac{1}{3}\right) \cup \left(\frac{1}{3}, \infty\right)$ **d.** $(-\infty, \infty)$

19. $\frac{f(x+h) - f(x)}{h}$ **19.** _____

a. h **b.** 5
c. $5x + 2h$ **d.** $5x + 2h - 4$

20. $(f + g)(-1)$ **20.** _____

a. -1 **b.** -5
c. 2 **d.** 5

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CHAPTER 2, FORM E

21. $\left(\frac{f}{g}\right)(0)$ **21.** _____

a. $-\frac{3}{4}$ **b.** $\frac{1}{4}$

c. $-\frac{4}{3}$ **d.** $\frac{15}{2}$

22. $(g \circ f)(x)$ **22.** _____

a. $25x^2 + 40x - 19$ **b.** $25x^2 - 40x + 19$

c. $25x^2 - 40x - 19$ **d.** $25x^2 + 40x + 19$

23. $(g \circ f)(1)$ **22.** _____

a. -6 **b.** 4

c. 0 **d.** 1

24. $(f \circ g)(x)$ **24.** _____

a. $5x^2 - 11$ **b.** $5x^2 + 11$

c. $5x^2 + 19$ **d.** $5x^2 - 12$

25. $(f \circ g)(0)$ **25.** _____

a. -1 **b.** 0

c. 11 **d.** 15

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CHAPTER 2, FORM F
COLLEGE ALGEBRA

NAME_____
DATE_____

Choose the best answer.

1a. Which of the following is the domain of $f(x) = \sqrt{x-1}$? **1a.** _____

a. $[0,1]$ **b.** $(-\infty, 1]$

c. $[1,\infty)$ **d.** $(-\infty,\infty)$

1b. Which of the following is the range of $f(x) = x^2 - 4$? **1b.** _____

a. $[-2,\infty)$ **b.** $[-4,\infty)$

c. $[-4,4]$ **d.** $[0,\infty)$

1c. Which of the following is the domain of $f(x) = \sqrt[3]{x-7}$? **1c.** _____

a. $(-\infty,\infty)$ **b.** $(-\infty,3]$

c. $[0,\infty)$ **d.** $[3,\infty)$

1d. Which of the following is the range of $f(x) = |x| + 2$? **1d.** _____

a. $[-2,2]$ **b.** $[0,2]$

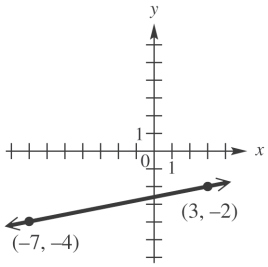
c. $[2,\infty)$ **d.** $[0,\infty)$

1e. Which of the following is the domain of $x = y^2$? **1e.** _____

a. $(-\infty,\infty)$ **b.** $[0,\infty)$

c. $(0,\infty)$ **d.** $(-\infty,0]$

The graph shows the line that passes through $(-7,-4)$ *and* $(3,-2)$. *Refer to it to answer Exercises 2-6.*



2. What is the slope of the line? **2.** _____

a. 0 **b.** $-\frac{1}{5}$

c. $\frac{1}{5}$ **d.** 5

3. What is the distance between the two points shown? **3.** _____

a. $\sqrt{122}$ **b.** $2\sqrt{26}$

c. $2\sqrt{13}$ **d.** $2\sqrt{34}$

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CHAPTER 2, FORM F

4. What are the coordinates of the midpoint of the *segment* joining the two points? **4.** _____

a. $\left(\frac{1}{2}, -\frac{11}{2}\right)$ **b.** $(-2, -1)$

c. $(-5, -1)$ **d.** $(-2, -3)$

5. Find the standard form of the equation of the line. **5.** _____

a. $5x - y = 17$ **b.** $5x + y = -17$

c. $x - 5y = 13$ **d.** $x + 5y = -13$

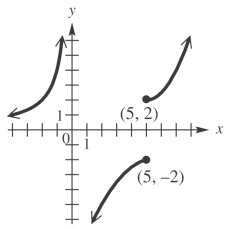
6. Find the standard form of the equation of the line. **6.** _____

a. $f(x) = \frac{1}{5}x - \frac{13}{5}$ **b.** $f(x) = -5x + 17$

c. $f(x) = 5x - 17$ **d.** $f(x) = \frac{1}{5}x + \frac{13}{5}$

Tell whether each graph is that of a function. Give the domain and range.

7. **7.** _____



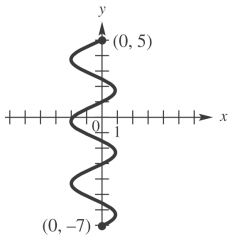
a. not a function; domain: $(-\infty, 0) \cup (0, \infty)$; range: $(-\infty, -2] \cup (0, \infty)$

b. not a function; domain: $(-\infty, \infty)$; range: $(-\infty, \infty)$

c. not a function; domain: $(-\infty, 0) \cup (0, \infty)$; range: $(-\infty, \infty)$

d. not a function; domain: $(-\infty, 0) \cup (0, \infty)$; range: $(-\infty, -2] \cup (2, \infty)$

8. **8.** _____



a. not a function; domain: $[-2, 1]$; range: $(-\infty, \infty)$

b. not a function; domain: $[-7, 5]$; range: $[-2, 1]$

c. not a function; domain: $[-7, 5]$; range: $(-\infty, \infty)$

d. not a function; domain: $[-2, 1]$; range: $[-7, 5]$

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CHAPTER 2, FORM F

9. Suppose point P has coordinates $(-6,3)$. **9.** _____
What is the equation of the horizontal line through P?

a. $x=3$ **b.** $y=3$

c. $x=-6$ **d.** $y=-6$

10. Find the slope-intercept form of the equation of the line passing. **10.** _____
through $(1,2)$ perpendicular to the graph of $y=-\frac{1}{8}x+\frac{1}{3}$.

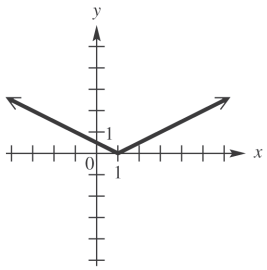
a. $y=8x-3$ **b.** $y=\frac{1}{8}x-\frac{1}{3}$

c. $y=-8x+3$ **d.** $y=-\frac{1}{8}x+\frac{17}{8}$

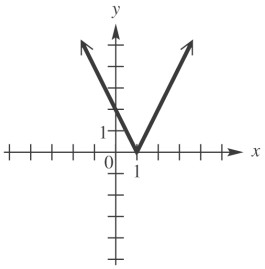
Graph each relation.

11. $f(x)=\frac{1}{2}|x+1|$ **11.** _____

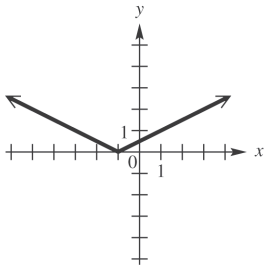
a.



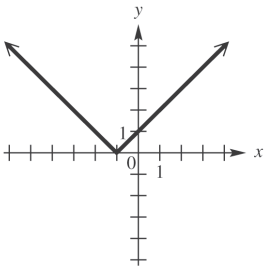
b.



c.



d.



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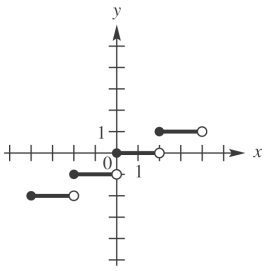
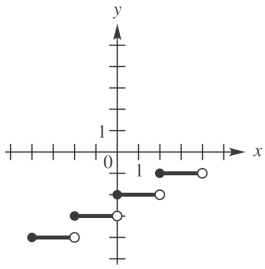
12. $f(x) = \left\lfloor\left\lfloor \frac{1}{2}x \right\rfloor\right\rfloor - 2$ **12.** _____

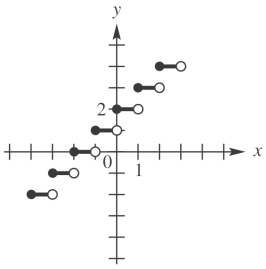
a.



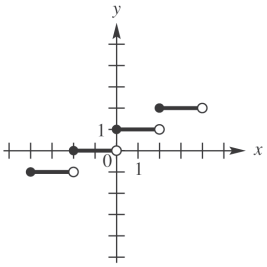
b.



c.

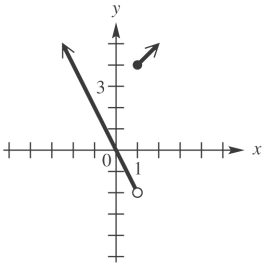


d.

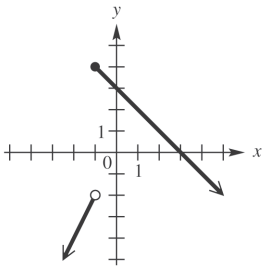


13. $f(x) = \begin{cases} -2x & \text{if } x < -1 \\ x + 3 & \text{if } x \geq -1 \end{cases}$ **13.** _____

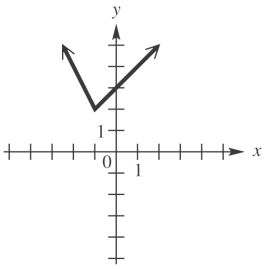
a.



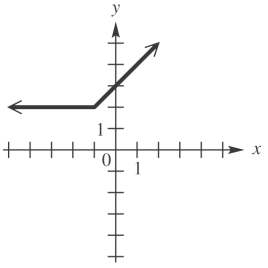
b.



c.



d.



14. Explain how the graph of $y = \sqrt{x+3} + 1$ can be obtained from the graph of $y = \sqrt{x}$. **14.** _____

a. Translate 3 units to the right and 1 unit up.
b. Translate 3 units to the right and 1 unit down.
c. Translate 3 units to the left and 1 unit up.
d. Translate 3 units to the left and 1 unit down.

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CHAPTER 2, FORM F

15. Determine the symmetries of the graph of the relation $4x^2 + 9y^2 = 36$. **15.** _____

a. x-axis only **b.** y-axis only
c. Origin only **d.** x-axis, y-axis, and origin

Given $f(x) = 6x^2 + 5x - 6$ *and* $g(x) = 2x - 8$, *find each of the following. Simplify the expressions when possible.*

16. $f(-3)$ **16.** _____

a. -9 **b.** 21
c. 33 **d.** 51

17. $\dfrac{f(x+h) - f(x)}{h}$ **17.** _____

a. $12x + 6h + 5$ **b.** $12x - 6h - 5$
c. $-12x = 6h + 5$ **d.** $-12x + 6h - 5$

18. $(f \circ g)\left(\dfrac{3}{2}\right)$ **18.** _____

a. -131 **b.** 119
c. -181 **d.** 169

19. $(f + g)(x)$ **19.** _____

a. $6x^2 + 7x - 14$ **b.** $6x^2 - 7x - 14$
c. $6x^2 + 7x - 2$ **d.** $6x^2 - 3x - 2$

20. $(f + g)(0)$ **20.** _____

a. -15 **b.** -14
c. -27 **d.** 1

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CHAPTER R, FORM A

1. **a.** $\{\sqrt{49}\}$

   b. $\left\{-9.6, \frac{54}{7}, 0, 2.\overline{15}, \frac{16}{5}, \sqrt{49}\right\}$

   c. $\{6\pi, \sqrt{13}\}$

2. $\frac{4}{49}$

3. **a.** distributive

   b. inverse

   c. associative

   d. commutative

4. $9a^2+6ab+b^2-12a-4b+4$

5. $-3x^2-3x+2$

6. $2x^3-5x^2+7x-6$

7. $x^2-2xy+y^2-49$

8. $8x^3+60x^2+150x+125$

9. $3y^2-5y-8-\frac{16}{y^2-2}$

10. $\frac{x+3}{x^2}$

11. $\frac{2x^2+19x+1}{(x+4)(x-4)}$

12. 1

13. $\frac{x^2y^2}{11(x+y)}$

14. $\frac{10}{21}$

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

16. $8(a+2b)(a^2-2ab+4b^2)$

17. $x^2(2x-7)(3x+5)$

18. $(14x+9)(2x-1)$

19. $\frac{9}{25}$

20. $\frac{z^2}{x^{11/2}y^{9/2}}$

21. $2xyz\sqrt{x^2z}$

22. $24x\sqrt{7x}$

23. $7-3\sqrt[3]{4}+20\sqrt[3]{2}$

24. $-20-8\sqrt{7}$

25. 0.8, 80%

26. –70.6°F

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CHAPTER R, FORM B

1. **a.** $\{17, \sqrt{25}\}$

b. $\left\{17, 0, -\frac{12}{3}, \sqrt{25}\right\}$

c. $\{-\pi, \sqrt{3}\}$

2. $-\frac{16}{5}$

3. **a.** associative

b. commutative

c. identity

d. inverse

4. $9x^2 - 6xy + y^2 - 6x + 2y + 1$

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

6. $-4x^2 + x$

7. $x^2 - 6x + 9 - y^2$

8. $8x^3 - 36x^2y + 54xy^2 - 27y^3$

9. $2x^3 - x^2 + x - 3 - \frac{6}{3x-2}$

10. $\frac{x-1}{x}$

11. $\frac{x^2+4x+5}{x(x+5)(x-5)}$

12. 3

13. $\frac{x^2-3x-4}{x^2+5x-3}$

14. $\frac{1}{19}$

15. $(8x+3)(x-7)$

16. $3(x+3)(x-3)(x+1)$

17. $y(x-1)(x^2+x+1)(y-4)(y+4)$

18. $3ab(2b-c)(2b+c)$

19. $\frac{16}{9}$

20. $\frac{a^{5/3}}{b^{10}c^2}$

21. $5x^8y^3z^5\sqrt{3y}$

22. $-3\sqrt{6x}$

23. $-54 - 9\sqrt[3]{5} + 8\sqrt[3]{25}$

24. $\frac{3\sqrt[3]{4}}{4}$

25. 1.6, 160%

26. approximately 55.6 mph

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CHAPTER R, FORM C

1. a. $\left\{\frac{70}{10}, -\frac{1}{8}, 0, \sqrt{64}, 1.\overline{23}, -4, 2.76\right\}$

b. $\left\{\frac{70}{10}, -\frac{1}{8}, -2\pi, 0, \sqrt{64}, \sqrt{19}, 1.\overline{23}, -4, 2.76\right\}$

c. $\left\{\frac{70}{10}, 0, \sqrt{64}\right\}$

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

3. a. commutative

b. inverse

c. distributive

d. associative

4. $x^2 - 8xy + 16y^2 + 4x - 16y + 4$

5. $2x^2 - x$

6. $6x^3 - 5x^2y + 6xy^2 + 8y^3$

7. $a^2 + 10a + 25 - 4b^2$

8. $64b^3 - 144b^2c + 108bc^2 - 27c^3$

9. $x^2 - 2 + \frac{-x^2 + 5}{x^3 - 2}$

10. $\frac{(2x-3)(3x+2)}{(x-2)(2x^2-3)}$

11. $\frac{(x+5)^2}{x+4}$

12. -1

13. $\frac{x}{2+x}$

14. $-\frac{72}{5}$

15. $(5x-2y)(2x-3y)$

16. $(x-2)(x+2)(x^2+4)$

17. $(a-2b)(a+2b)^2$

18. $2x^2(x-3y)(x+3y)$

19. $\frac{256}{81}$

20. $\frac{a^{39/2}}{b^6c^9}$

21. $4a^2b^6\sqrt{5ab}$

22. 0

23. $9x - 4y$

24. $-3\sqrt{3} + 3\sqrt{7}$

25. 2.4, 240%

26. approximately 42.7 mph

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CHAPTER R, FORM D

1. **a.** $\left\{\sqrt{49}, 8\right\}$

b. $\left\{-17.8, -3.\overline{6}, 0, -\frac{10}{2}, \sqrt{49}, \frac{5}{3}, 8\right\}$

c. $\left\{0, -\frac{10}{2}, \sqrt{49}, 8\right\}$

2. $\frac{1}{100}$

3. **a.** commutative

b. associative

c. identity

d. distributive

4. $4x^2 - 12xy + 9y^2 - 8x + 12y + 4$

5. $2x^4 - x^3 - 6x^2 + 7x - 2$

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

7. $r^2 + 4rs + 4s^2 - 16$

8. $8a^3 + 12a^2b + 6ab^2 + b^3$

9. $2y^2 - 2y - 5 - \frac{15}{y^2 - 3}$

10. $\frac{x+1}{5}$

11. $\frac{10}{(x-8)(x+7)}$

12. $\frac{1}{2-x}$

13. $\frac{x(3x+5)}{(x-2)(x+2)^2}$

14. $-\frac{4}{3}$

15. $(6x-1)(3x-4)$

16. $(3x^2 - 2)(2x^2 + 5)$

17. $(r-2s)^2(r^2 + 2rs + 4s^2)$

18. $8(x+2y)(x^2 - 2xy + 4y^2)$

19. $\frac{343}{64}$

20. $\frac{x^5 z^{13/2}}{y^{31/2}}$

21. $2a^7b^9c^2\sqrt{21c}$

22. $6x\sqrt[4]{3x}$

23. $-2 + 2\sqrt{15}$

24. $\frac{2\sqrt{3}}{9}$

25. -0.375, -37.5%

26. approximately 35.2 m

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CHAPTER R, FORM E

1. **A.** d **B.** c **C.** d
2. b
3. **A.** c **B.** d **C.** b **D.** a
4. b
5. c
6. c
7. b
8. c
9. d
10. d
11. b
12. c
13. b
14. c
15. d
16. d
17. c
18. c
19. c
20. a
21. c
22. c
23. b
24. c
25. a
26. a

CHAPTER R, FORM F

1. **A.** d **B.** b **C.** b
2. b
3. **A.** c **B.** a **C.** b **D.** c
4. b
5. c
6. d
7. d
8. d
9. d
10. c
11. b
12. b
13. c
14. b
15. a
16. b
17. a
18. c
19. a
20. b
21. d
22. a
23. a
24. b
25. a
26. b

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CHAPTER 1, FORM A

1. $\varnothing$
2. $\left\{\frac{51}{5}\right\}$
3. $\left\{-\frac{3}{2}, \frac{5}{4}\right\}$
4. $\left\{\frac{1}{3} \pm \frac{1}{3}i\sqrt{5}\right\}$
5. $\left\{-\frac{1}{3}\right\}$
6. $\{2\}$
7. $\{-2, 1\}$
8. $\{\pm 2, \pm 3\}$
9. $\{-59, 6\}$
10. $\{1\}$
11. $\{0, -6\}$
12. $W = \frac{S - 2LH}{L + 2H}$
13. $17 - i$
14. $11 - 7i$
15. $\frac{9}{74} + \frac{17}{74}i$
16. i
17. $(-\infty, 1) \cup (4, \infty)$
18. $(6, 12]$
19. $(-\infty, -14)$
20. $(-\infty, -1] \cup [2, \infty)$
21. $(-\infty, -1) \cup (5, \infty)$
22. \$10,500 at 2%; \$11,500 at 4%
23. $7\frac{1}{2}$ hr
24. 1 sec and 3 sec
25. 2013

CHAPTER 1, FORM B

1. $\left\{-\frac{40}{9}\right\}$
2. $\left\{\frac{-3 \pm \sqrt{7}}{2}\right\}$
3. $\{25\}$
4. $\{3 \pm 2i\}$
5. $\{-32\}$
6. $\{\pm 2, \pm i\}$
7. $\{0\}$
8. $\{-5, 4\}$
9. $\left\{-5, -\frac{3}{2}\right\}$
10. $\{1, 2\}$
11. $\{-62, 10\}$
12. $\left\{\frac{3}{2}, \frac{5}{2}\right\}$
13. $-2 + 3i$
14. $-28 + 6i$
15. $-\frac{7}{13} - \frac{22}{13}i$
16. -1
17. $\left[\frac{1}{3}, \frac{1}{2}\right]$
18. $(-\infty, -6)$
19. $(-\infty, 2)$
20. $\left(-\frac{9}{2}, -\frac{1}{2}\right)$
21. $(-1, 2)$
22. 4 lb
23. 120 months
24. 2013
25. 3 sec, 3.75 sec

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CHAPTER 1, FORM C

1. $\{1\}$

2. $\left\{\frac{29}{4}\right\}$

3. v

4. $\{5, -9\}$

5. $\left\{-\frac{175}{26}\right\}$

6. $\{-3, 3\}$

7. $\{-1\}$

8. $\left\{\frac{\pm\sqrt{2}}{2}, \frac{\pm\sqrt{6}}{3}\right\}$

9. $\left\{\frac{4}{3}, \frac{3}{2}\right\}$

10. $\{6\}$

11. $\left\{2, -\frac{8}{7}\right\}$

12. $x = \frac{2az - 3by}{a + 5b}$

13. $-7 - 8i$

14. $41 - 11i$

15. $\frac{2}{5} + \frac{4}{5}i$

16. 1

17. $(-\infty, 1) \cup (4, \infty)$

18. $(-\infty, 2)$

19. $\left(-\frac{1}{2}, -\frac{4}{9}\right)$

20. $\left[\frac{5}{3}, 3\right]$

21. $(-4, -1)$

22. 50 lb

23. 12 hr

24. $6\frac{3}{4}$ sec

25. 2016

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CHAPTER 1, FORM D

1. $\{-4\}$
2. $\left\{-\frac{1}{2}\right\}$
3. $\left\{\frac{3}{5} \pm \frac{7}{5}i\right\}$
4. $\left\{\frac{-1 \pm \sqrt{61}}{10}\right\}$
5. No solution
6. $\{2, -1\}$
7. $\{2\}$
8. $\{\pm 4, \pm 4i\}$
9. $\{-2, 1, 3, 6\}$
10. $\varnothing$
11. $\left\{2, \frac{8}{5}\right\}$
12. $C = \frac{2}{P + N - 1}$
13. $-22 + 29i$
14. $4 + 7i$
15. $\frac{1}{5} - \frac{7}{5}i$
16. i
17. $(-3, 2)$
18. $(-\infty, 16]$
19. $(-\infty, -1) \cup (3, \infty)$
20. $(-2, 1) \cup (3, 6)$
21. $\left(-\frac{1}{3}, \frac{19}{3}\right)$
22. 2 gal
23. \$16,500 at 3.5%; \$12,000 at 2.5%
24. 2 sec and 12 sec
25. 1987

CHAPTER 1, FORM E

1. b
2. c
3. b
4. b
5. d
6. c
7. c
8. c
9. a
10. d
11. d
12. b
13. b
14. b
15. c
16. a
17. a
18. d
19. a
20. c
21. c
22. c
23. b
24. c
25. c

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CHAPTER 1, FORM F

1. a
2. a
3. c
4. c
5. c
6. b
7. d
8. a
9. d
10. d
11. c
12. d
13. c
14. c
15. c
16. a
17. c
18. b
19. b
20. b
21. a
22. c
23. d
24. c
25. b

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CHAPTER 2, FORM A

1. **a.** B

b. G

c. A

d. D

e. A

f. A

g. A

h. B

i. A

j. H

2. $\frac{7}{4}$

3. $\sqrt{65}$

4. $\left(-3, \frac{1}{2}\right)$

5. $7x - 4y = -23$

6. $f(x) = \frac{7}{4}x + \frac{23}{4}$

7. Function; domain: $(-\infty, 0) \cup (0, \infty)$; range: $(0, \infty)$; increasing: $(-\infty, 0)$; decreasing: $(0, \infty)$

8. Not a function; domain: $[-7, \infty)$; range: $[-7, \infty)$

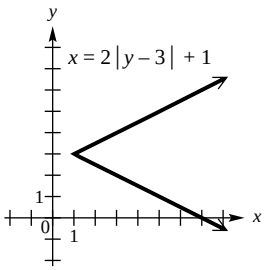
9. **a.** $x = \frac{3}{5}$

b. $y = \frac{4}{7}$

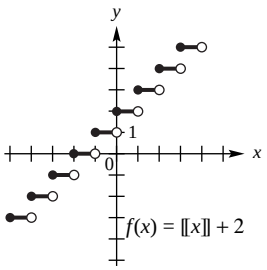
10. **a.** $y = 4x - 3$

b. $y = -\frac{1}{4}x + \frac{11}{2}$

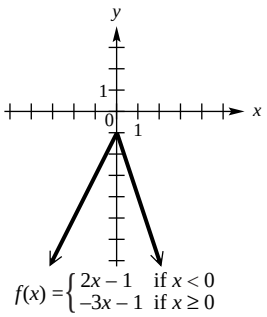
11.



12.



13.



14. Translate the graph of $y = \sqrt{x}$ to the left 3 units, stretch by a factor of $\frac{1}{2}$, reflect across the x-axis, and translate 5 units up.

15. **a.** Yes **b.** Yes **c.** Yes

16. $2x^3 + x^2 - 2x - 1$

17. $x^2 + 2x$

18. $x \neq 1,\ x \neq -1$

19. $2x + h$

20. -3

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

22. $4x^2 + 4x$

23. 8

24. $2x^2 - 1$

25. 7

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CHAPTER 2, FORM B

1. **a.** H

b. B

c. D

d. A

e. A

f. A

g. A

h. G

i. D

j. A

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

3. $2\sqrt{10}$

4. $(1, -2)$

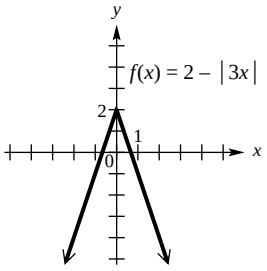
5. $x + 3y = -5$

6. $f(x) = -\frac{1}{3}x - \frac{5}{3}$

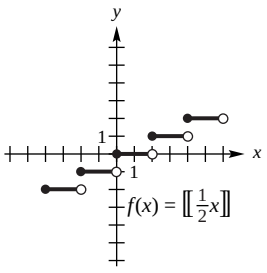
7. Function;
domain: $[-6, -2] \cup [2, 8]$;
range: $[-5, -2] \cup [1, 6]$;
increasing: $[-6, -2]$; decreasing: $[2, 8]$

8. Not a function; domain: $[-3, \infty)$;
range: $(-\infty, \infty)$

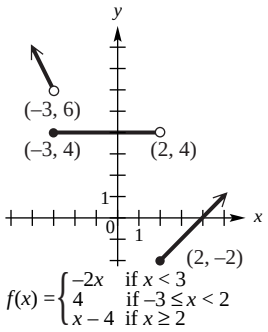
9.



10.



11.



12. **a.** $x = -\frac{3}{8}$

b. $y = \frac{5}{9}$

13. **a.** $y = -3x - 15$

b. $y = \frac{1}{3}x + 5$

14. Translate the graph of $y = \sqrt{x}$ to the left 4 units, stretch by a factor of $\frac{1}{3}$, and translate 2 units up.

15. **a.** Yes **b.** No **c.** No

16. $6x^3 + 17x^2 + 4x - 12$

17. $2x^2 + 4x + 8$

18. $x \neq -2, -\frac{3}{2}$

19. $4x + 2h + 7$

20. 16

21. $x = \frac{1}{15}$

22. $18x^2 - 3x$

23. 0

24. $6x^2 + 21x + 16$

25. 16

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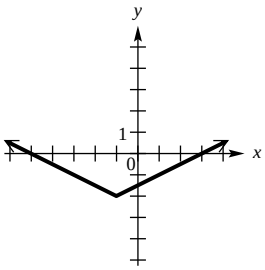
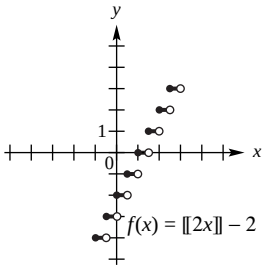
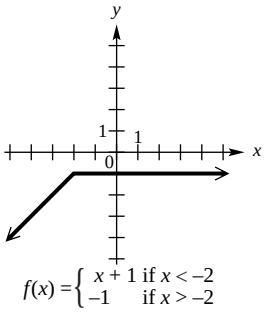
CHAPTER 2, FORM C

1. **a.** H
   b. B
   c. G
   d. A
   e. A
   f. A
   g. A
   h. F
   i. D
   j. A
2. $-\frac{7}{6}$
3. $\sqrt{85}$
4. $\left(0, \frac{3}{2}\right)$
5. $7x + 6y = 9$
6. $f(x) = -\frac{7}{6}x + \frac{3}{2}$
7. Not a function; domain:[–1, 7]; range: [–1, 7]
8. Function; domain: [– 4, 6] range: [0, 5]; increasing: [– 4, 1]; decreasing: [1, 6]
9. **a.** $x = \frac{\sqrt{2}}{2}$
   b. $y = -\frac{\sqrt{5}}{3}$
10. **a.** $y = \frac{4}{5}x - \frac{26}{5}$
    b. $y = -\frac{5}{4}x + 3$
11. 

12. 

13. 

14. Translate the graph of $y = |x|$ to the left 4 units, stretch by a factor of 3, and translate 2 unit up.
15. **a.** No **b.** Yes **c.** No
16. $12x^3 + 12x^2 - 8x - 8$
17. $-3x^2 + 4x + 6$
18. 10
19. $6x + 3h$
20. –4
21. $-\frac{5}{2}$
22. $3x^2 - 4x - 6$
23. $48x^2 + 96x + 46$
24. $12x^2 - 4$
25. 8

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CHAPTER 2, FORM D

1. **a.** G

b. D

c. G

d. B

e. B

f. B

g. B

h. H

i. D

j. B

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

3. $2\sqrt{26}$

4. $(-2,-3)$

5. $x - 5y = 13$

6. $f(x) = \frac{1}{5}x - \frac{13}{5}$

7. Function; domain: $[-6,-2] \cup [2,8]$;

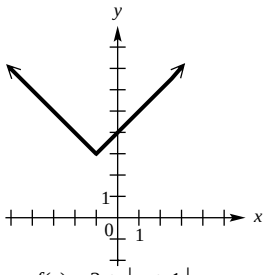
range: $[-6,-2] \cup [1,6]$

increasing: $[-6,-2]$; decreasing: $[2,8]$

8. Not a function; domain: $(-3,\infty)$;

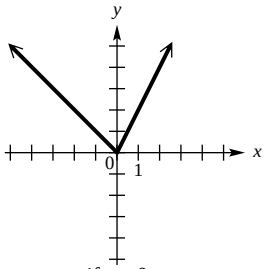
range: $(-\infty,\infty)$

9.



$f(x) = 3 + |x + 1|$

10.



$f(x) = \begin{cases} -x & \text{if } x < 0 \\ 2x & \text{if } x \geq 0 \end{cases}$

11. **a.** $x = -\pi$

b. $y = 0.15$

12. **a.** $y = -\frac{4}{3}x - \frac{11}{3}$

b. $y = \frac{3}{4}x - \frac{23}{4}$

13. $-\frac{11}{19}$

14. Translate the graph of $y = \sqrt{x}$ to the right 1 unit, stretch by a factor of 3, and translate 2 units down.

15. **a.** No **b.** No **c.** Yes

16. $2x^3 - x$

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

18. -1

19. $6x^2 + 6xh + 2h^2 - 3$

20. 2

21. 0

22. $16x^3 + 24x^2 + 6x - 2$

23. 44

24. $4x^3 - 6x - 1$

25. -3

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CHAPTER 2, FORM E

1a. d
1b. a
1c. a
1d. d
1e. b
2. c
3. c
4. a
5. c
6. b
7. a
8. d
9. a
10. a
11. a
12. d
13. c
14. d
15. c
16. b
17. a
18. a
19. b
20. b
21. c
22. b
23. b
24. b
25. c

CHAPTER 2 FORM F

1a. c
1b. b
1c. a
1d. c
1e. b
2. c
3. b
4. d
5. c
6. a
7. a
8. d
9. b
10. d
11. c
12. b
13. c
14. c
15. d
16. c
17. a
18. b
19. a
20. b

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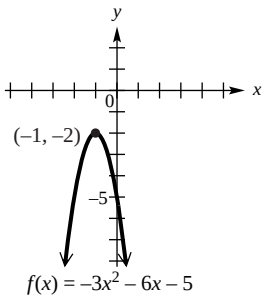
CHAPTER 3, FORM A

1.



x-intercepts: none
y-intercept: –5
vertex: (–1, –2)
axis: $x = -1$
domain: $(-\infty, \infty)$
range: $(-\infty, -2]$

2. 85 ft

3. $x^4 - 3x^3 + 17x^2 + 3x + 17 + \dfrac{29}{x-1}$

4. $x^3 - 4x^2 + 2x - 3 + \dfrac{12}{x+4}$

5. 578

6. No; when the polynomial is divided by $x - 2$, the remainder is 1.

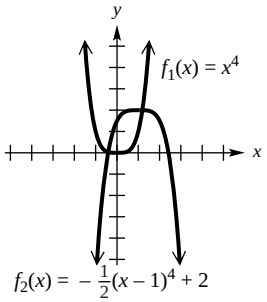
7. $-1, 1, 8$

8. $f(x) = -3x^3 + 15x^2 - 3x + 15$

9. a. $f(0) = 4 > 0,$ while
$f(-1) = -2 < 0.$

b. –2.22028; –.654992; 1.37527

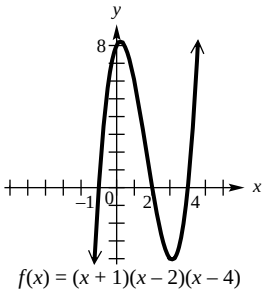
10.



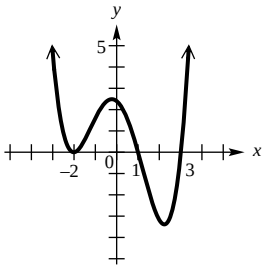
To obtain the graph of f_2, shift the graph of f_1 1 unit to the right, stretch by a factor of 1/2, reflect across the x-axis, and shift 2 units up.

11. d

12.

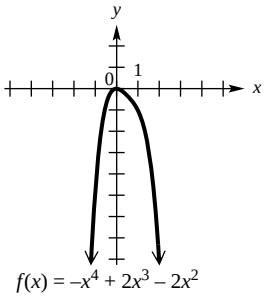


13.



$f(x) = (x-1)(x-3)(x+2)^2$

14.



$f(x) = -x^2\left(x^2 - 2x + 2\right)$

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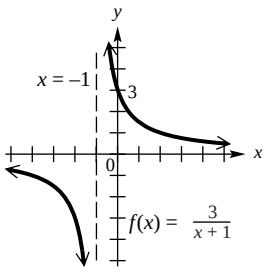
15. $f(x)=\frac{1}{2}x(x-3)(x+1)$

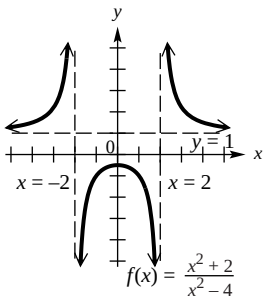
16. $(-\infty,-2)\cup(-2,1)$

17. $[-3,0)\cup(3,\infty)$

18.



19.



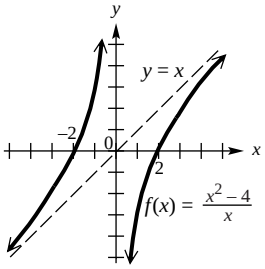
20. **a.** $y=x$

b. –2, 2

c. None

d. $x=0$

e.

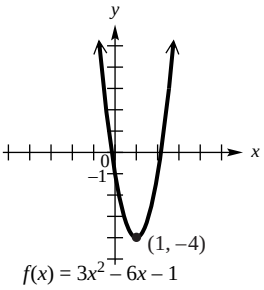


21. 16 newtons per sq m

22. 10 foot-candles

CHAPTER 3, FORM B

1.



x-intercepts: $1\pm\frac{2\sqrt{3}}{3}$

y-intercept: –1
vertex: (1, –4)
axis: $x = 1$
domain: $(-\infty,\infty)$
range: $[-4,\infty)$

2. **a.** \$751

b. 30 hotdogs; \$976

3. $q(x): 4x^3+9x^2+27x+80$
r: 245

4. $q(x): x^3+2x^2-3x+1$
r: 0

5. – 49

6. Yes; $2x^4-3x^3-x^2+4x-6$

7. $-2,-4,3$

8. $f(x)=-x^4-2x^3+7x^2-2x+8$

9. **a.** $f(-1)=6>0,$ while $f(-2)=-2<0.$

b. 0.678363, –1.85577, 3.17741

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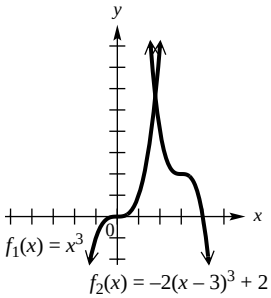
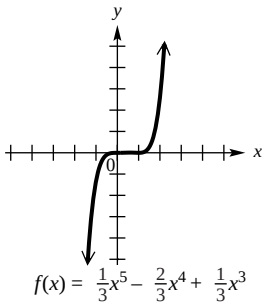
10.



To obtain the graph of f_2, shift the graph of f_1
3 units to the right, stretch by a factor of 2, reflect across the x-axis, and shift 2 units up.

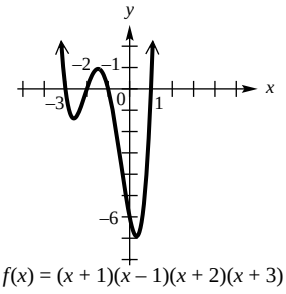
11. a

12.

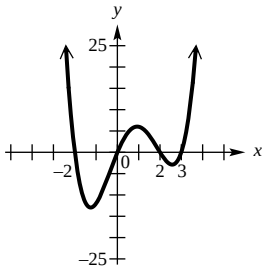


$$f(x) = \frac{1}{3}x^3(x-1)^2$$

13.



14.



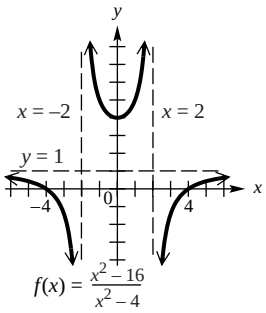
$$f(x) = x(x-3)(x+2)(x-2)$$

15. $f(x) = -2(x-2)^2(x+1)$

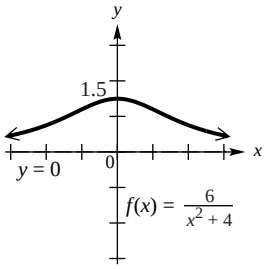
16. $(-\infty, -1] \cup (0, \infty)$

17. $[-4, 0) \cup (2, \infty)$

18.



19.

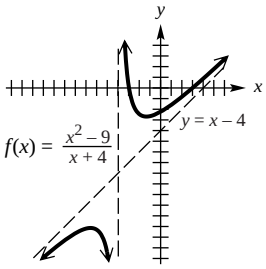


20. **a.** $y = x - 4$

b. $3, -3$

c. $-\frac{9}{4}$

d. $x = -4$



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21. 2 ohms

22. 28 inches

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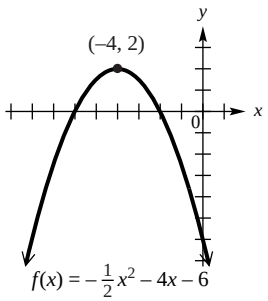
CHAPTER 3, FORM C

1.



x-intercepts: –2, –6
y-intercept: –6
vertex: (–4, 2)
axis: $x = -4$
domain: $(-\infty, \infty)$
range: $(-\infty, 2]$

2. **a.** \$590

b. 23 umbrellas; \$1168

3. $5x^2 - 15x + 23 - \dfrac{13}{x+1}$

4. $x^4 + x^3 + x^2 + x + 1$

5. 384

6. No; when the polynomial is divided by $x + 2$, the remainder is 114.

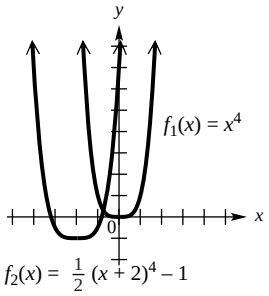
7. $-\dfrac{1}{2}, \dfrac{1}{2}, 3$

8. $f(x) = 2x^4 + 2x^3 - 22x^2 + 2x - 24$

9. **a.** $f(-3) = 13 > 0$, while $f(-4) = -19 < 0$.

b. 0.163097,0 .868150, –3.53124

10.

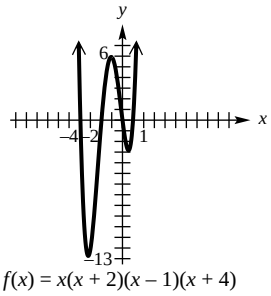


To obtain the graph of f_2, shift the graph of f_1

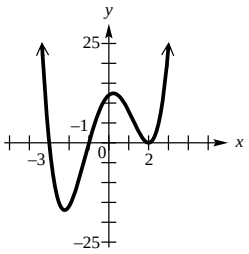
2 units to the left, stretch by a factor of $\dfrac{1}{2}$, and shift 1 unit down.

11. a

12.

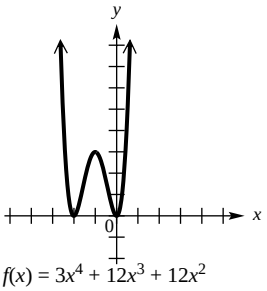


13.



$f(x) = (x+3)(x+1)(x-2)^2$

14.



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

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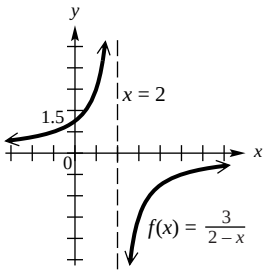
15. $f(x) = -\frac{1}{6}x(x-6)(x+3)$

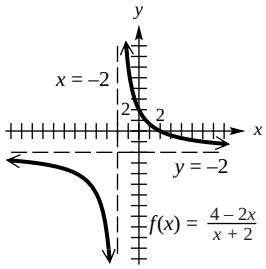
16. $(0,3)$

17. $(-1,1) \cup \left[\frac{3}{2}, \infty\right)$

18.



19.



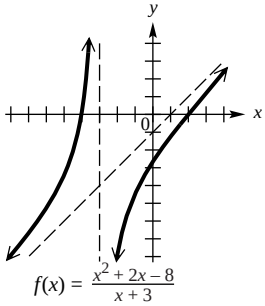
20. **a.** $y = x - 1$

b. $-4, 2$

c. $-\frac{8}{3}$

d. $x = -3$

e.

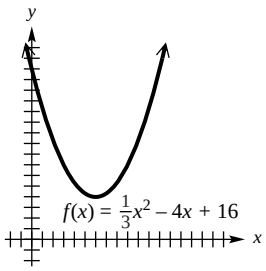


21. 375 g

22. .0054 cm

CHAPTER 3, FORM D

1.



x-intercepts: none
y-intercept: 16
vertex: (6, 4)
axis: $x = 6$
domain: $(-\infty, \infty)$
range: $[4, \infty)$

2. **a.** 336 ft

b. 400 ft; 5 sec

3. $q(x): 3x^3 - 2x^2 - 4x + 2 + \frac{7}{x-2}$

4. $q(x): -5x^2 - 3x + 5$
r: 0

5. 223

6. Yes; $x^3 + 2x^2 - 5x + 4$

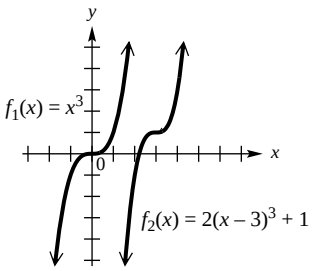
7. $-4, -9$

8. $f(x) = x^3 - 13x + 12$

9. **a.** $f(4) = 14 > 0$, while $f(5) = -6 < 0$.

b. 0.794932; –1.57802; 4.78309

10.



To obtain the graph of f_2, shift the graph of f_1 3 units to the right, stretch by a factor of 2, and shift 1 unit up.

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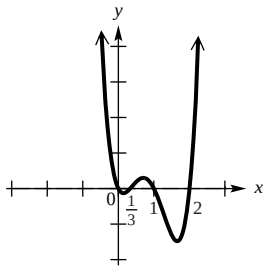
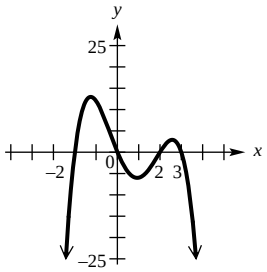
11. c

12.



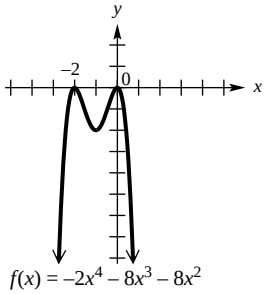
$f(x) = x(3x-1)(x-1)(x-2)$

13.



$f(x) = -x(x-3)(x+2)(x-2)$

14.



$f(x) = -2x^4 - 8x^3 - 8x^2$

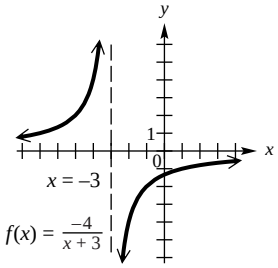
$f(x) = -2x^2(x+2)^2$

15. $f(x) = -2(x+1)^2(x-1)$

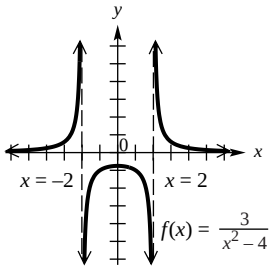
16. $[3, \infty)$

17. $(1,3) \cup (5,\infty)$

18.



19.



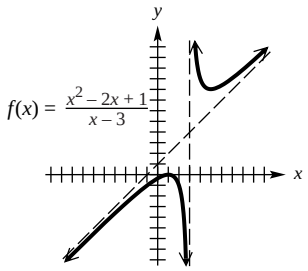
20. **a.** $y = x + 1$

b. 1

c. $-\frac{1}{3}$

d. $x = 3$

e.



21. 2/9 foot-candle

22. 15.2 ft

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CHAPTER 3, FORM E

1. b
2. a
3. b
4. c
5. c
6. a
7. d
8. b
9. d
10. b
11. c
12. a
13. b
14. b
15. c
16. a
17. a
18. d
19. c
20. b
21. b
22. a

CHAPTER 3, FORM F

1. a
2. b
3. c
4. d
5. a
6. c
7. a
8. c
9. a
10. a
11. d
12. b
13. d
14. c
15. a
16. c
17. a
18. d
19. c
20. b
21. a
22. b

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CHAPTER 4, FORM A

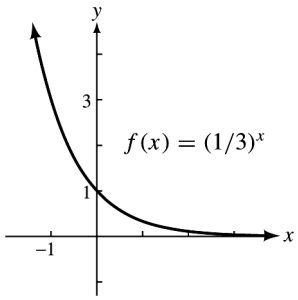
1a. $[-9,\infty);[0,\infty)$

1b. $f^{-1}(x)=x^2-9$

1c. $[0,\infty);[-9,\infty)$

2. b

3.



4. $\{9\}$

5a. $\log_6 216=3$

5b. $4^5=1024$

6. $\frac{7}{4}\ln x-\frac{5}{4}\ln y-\frac{1}{4}\ln z$

7. 6.477

8. $q=e^{3.5}\approx 33.116$

9. 2.322

10. **a.** 1

b. $\frac{1}{25}$

11. $\left(-\infty,-\frac{1}{3}\right]$

12. {9}

13. {1}

14. {8}

15. {4}

16. 2 and 3, since $4^2=16$ and $4^3=64$

17. 20 min

18. $1537.85

19. **a.** 813.1 g

b. 46.2 days

20. 23.8 yrs

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CHAPTER 4, FORM B

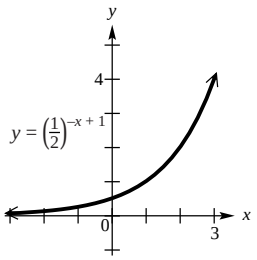
1a. $(-\infty, 4]; [0, \infty)$

1b. $f^{-1}(x) = 4 - x^2$

1c. $(-\infty, \infty); (-\infty, 4]$

2. d

3.



4. $\left\{\frac{3}{5}\right\}$

5a. $\log_3 a = 4.1$

5b. $8^b = \frac{1}{2}$

6. $2\log_3 y + \frac{1}{2}\log_3 z - \log_3 x$

7. 5.513

8. $q = e^{3.5} \approx 33.115$

9. 2.807

10. **a.** 243

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

11. $\left[\frac{1}{4}, \infty\right)$

12. $\{625\}$

13. $\{5\sqrt{5}\}$

14. $\{72\}$

15. $\{8\}$

16. 2 and 3, since $6^2 = 36$ and $6^3 = 216$

17. **a.** 3,306,953

b. 13.9 hr

18. 13 min

19. 14.7 yr

20. 16.7 yr

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CHAPTER 4, FORM C

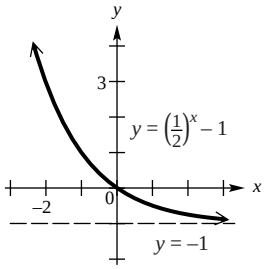
1a. $[4,\infty);[0,\infty)$

1b. $f^{-1}(x)=x^2+4$

1c. $[0,\infty);(-\infty,\infty)$

2. a

3.



4. $\left\{\frac{8}{3}\right\}$

5a. $\log_5 0.04=-2$

5b. $10^{5y}=x$

6. $\log_3 x+\log_3 z-\log_3 y$

7. 3.560

8. $y=e^{-0.28}=0.756$

9. 10.754

10. **a.** 16

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

11. $\left(-\infty,\frac{5}{3}\right]$

12. -7

13. $\{5\}$

14. $\{8.485\}$ or $6\sqrt{2}$

15. $\{4\}$

16. 3 and 4, since $3^3=27$ and $3^4=81$

17. **a.** 2130.4 g

b. 23.1 sec

18. 19 min

19. 45.1 yr

20. 13.7 yr

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CHAPTER 4, FORM D

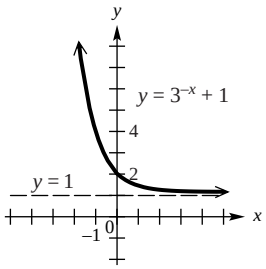
1a. $(-\infty,\infty);(-\infty,\infty)$

1b. $f^{-1}(x)=\dfrac{x^3+1}{2}$

1c. $(-\infty,\infty);(-\infty,\infty)$

2. b

3.



4. $\left\{-\dfrac{1}{4}\right\}$

5a. $\log_7\sqrt{7}=\dfrac{1}{2}$

5b. $49^{1/6}=\sqrt[3]{7}$

6. $\dfrac{1}{2}\log_2 x-\dfrac{2}{3}\log_2 y+\dfrac{1}{2}\log_2 z$

7. 6.799

8. $a=e^{-2.9}\approx 0.055$

9. 5.052

10. **a.** 100

b. 1

11. $\left(-\infty,\dfrac{3}{2}\right]$

12. {19}

13. {9}

14. {2}

15. $\left\{\dfrac{1}{2}\right\}$

16. 2 and 3, since $5^2=25$ and $5^3=125$

17. **a.** 7994

b. 2005

18. 19 in

19. 15.7 yr

20. 16.3 yr

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CHAPTER 4, FORM E

1. c
2. a
3. c
4. c
5. c
6. a
7. b
8. b
9. c
10. c
11. c
12. b
13. b
14. d
15. c
16. d
17. d
18. a
19. c
20. a

CHAPTER 4, FORM F

1. c
2. d
3. b
4. a
5. b
6. b
7. d
8. c
9. b
10. a
11. d
12. c
13. b
14. b
15. c
16. b
17. d
18. d
19. b
20. d

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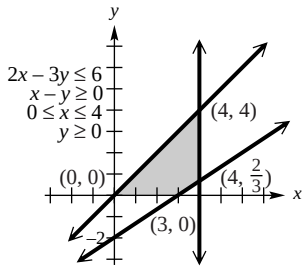
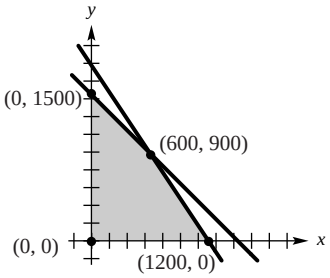
CHAPTER 5, FORM A

1. $\{(3, -2)\}$
2. $\varnothing$; inconsistent
3. $\{(3, -1, 2)\}$
4. $\left\{\left(-\frac{2}{5}, -3\right)\right\}$
5. $\left\{\left(\frac{8}{3}, -3, \frac{4}{3}\right)\right\}$
6. $y = \frac{x^2}{4} - \frac{x}{2} + 1$
7. -37
8. -125
9. $\{(1, -3)\}$
10. $\{(-2, -1, 3)\}$
11. $\frac{3}{x} + \frac{2}{x-5} - \frac{1}{x+1}$
12. $\{(3, 3), (9, 1)\}$
13. $\left\{\left(\sqrt{5}, 1\right), \left(\sqrt{5}, -1\right), \left(-\sqrt{5}, 1\right), \left(-\sqrt{5}, -1\right)\right\}$
14. Yes



15. 55 and 17
16. 

17. 600 model A lamps and 900 model B lamps



18. $x = -1;\ y = -3;\ z = -1$
19. $\begin{bmatrix} 4 & 2 & 10 \\ 5 & -2 & 4 \\ 2 & -2 & 1 \end{bmatrix}$
20. $\begin{bmatrix} 0 & 3 & 21 \\ 18 & 14 & 7 \\ -14 & 15 & 7 \end{bmatrix}$
21. $\begin{bmatrix} 18 & -1 & -4 \\ -35 & 0 & -1 \end{bmatrix}$
22. AB is 4×4; BA is 1×1.
23. $\begin{bmatrix} -\frac{7}{2} & 2 \\ -2 & 1 \end{bmatrix}$
24. $\begin{bmatrix} 1 & \frac{1}{6} & -\frac{1}{2} \\ 0 & -\frac{1}{6} & \frac{1}{2} \\ 0 & \frac{1}{3} & 0 \end{bmatrix}$
25. $\left\{\left(-\frac{1}{2}, 4\right)\right\}$

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CHAPTER 5, FORM B

1. No solution

2. $\{(6, 2)\}$

3. $\left\{\left(\frac{6}{11}, -\frac{7}{11}, 1\right)\right\}$

4. $\{(-5, 7)\}$

5. $\{(-2, 3, 1)\}$

6. $y = 0.5x^2 - 2x + 4$

7. 16

8. -84

9. $\left\{\left(-\frac{1}{2}, 1\right)\right\}$

10. $\{(1, 1, 3)\}$

11. $2 + \frac{3}{x+1} + \frac{4}{(x+1)^2}$

12. $\left\{\left(\frac{\sqrt{6}}{2}, \frac{\sqrt{2}}{2}\right), \left(\frac{\sqrt{6}}{2}, -\frac{\sqrt{2}}{2}\right), \left(-\frac{\sqrt{6}}{2}, \frac{\sqrt{2}}{2}\right), \left(-\frac{\sqrt{6}}{2}, -\frac{\sqrt{2}}{2}\right)\right\}$

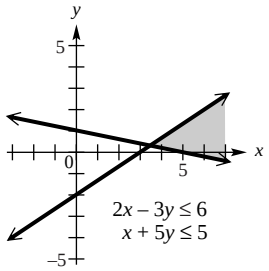
13. $\{(0, 1), (-1, 2)\}$

14. Yes

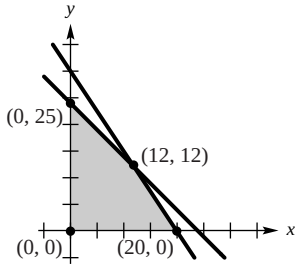


15. 8 and 7

16.



17. 12 VIP rinds and 12 SST rings



18. $x = 17;\ y = 2;\ z = 2$

19. $\begin{bmatrix} 26 \\ 10 \\ 12 \end{bmatrix}$

20. $\begin{bmatrix} -29 & 9 \\ 21 & -13 \end{bmatrix}$

21. not possible

22. AB cannot be found; BA is 5×4.

23. does not exist

24. $\begin{bmatrix} 3 & -2 & -2 \\ -1 & 1 & 1 \\ 2 & -\frac{3}{2} & -2 \end{bmatrix}$

25. $\{(2, 1)\}$

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CHAPTER 5, FORM C

1. $\{(4, -2)\}$

2. $\left\{\left(-\frac{10}{11}, \frac{10}{27}\right)\right\}$

3. $\{(1, -1, 2)\}$

4. $\left\{\left(-\frac{2}{3}, 3\right)\right\}$

5. $\varnothing$; inconsistent

6. $y = 3x^2 - 4x - 1$

7. 25

8. 0

9. $\left\{\left(\frac{4}{3}, \frac{1}{3}\right)\right\}$

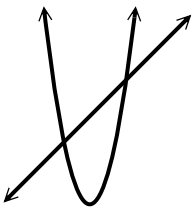
10. $\{(0, 2, -3)\}$

11. $-\frac{7}{x} + \frac{5}{x^2} + \frac{40}{3x-5}$

12. $\{(2, 1), (-2, -1), (i\sqrt{2}, -i\sqrt{2}), (-i\sqrt{2}, i\sqrt{2})\}$

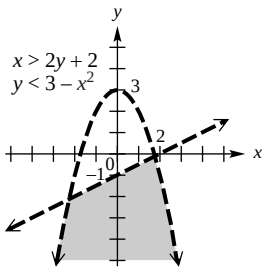
13. $\{(-2, 1), (1, 4)\}$

14. Yes

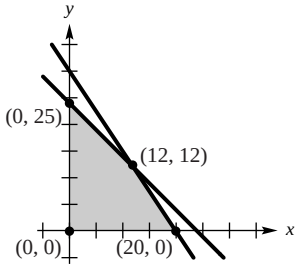


15. $\frac{2}{5}$ and 5

16.



17. 12 VIP rings and 12 SST rings



18. $x = -1;\ y = 1;\ z = 3$

19. $\begin{bmatrix} 15 & 11 & 0 \\ -5 & 15 & 14 \\ 25 & 5 & -10 \end{bmatrix}$

20. not possible

21. $\begin{bmatrix} 4 & 2 \\ -18 & 14 \\ -13 & -16 \end{bmatrix}$

22. AB is 2×2; BA is 5×5.

23. $\begin{bmatrix} -1 & -2 \\ -\frac{3}{2} & -\frac{5}{2} \end{bmatrix}$

24. $\begin{bmatrix} 5 & 0 & -4 \\ -3 & -1 & 3 \\ -1 & 0 & 1 \end{bmatrix}$

25. 20 dimes and 5 quarters

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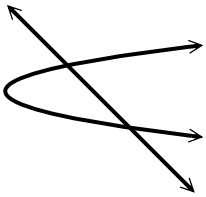
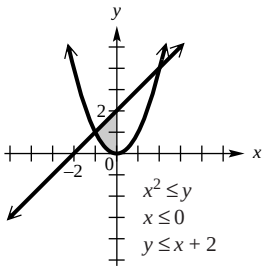
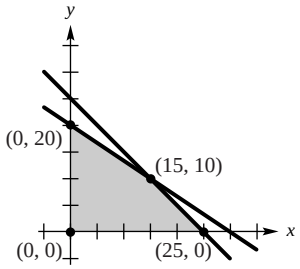
CHAPTER 5, FORM D

1. $\varnothing$; inconsistent
2. $\left\{\left(\frac{1}{9}, \frac{1}{3}\right)\right\}$
3. $\{(4, -2, 2)\}$
4. $\{(1, -2)\}$
5. $\{(1, 2, 0)\}$
6. $y = 0.5x^2 - 0.5x + 3$
7. 65
8. –86
9. $\left\{\left(-\frac{21}{13}, -\frac{1}{26}\right)\right\}$
10. $\{(2, 3, -1)\}$
11. $\frac{4}{x} + \frac{5x-3}{x^2+2}$
12. $\left\{\left(\frac{\sqrt{2}}{2}, \sqrt{2}\right), \left(-\frac{\sqrt{2}}{2}, -\sqrt{2}\right)\right\}$
13. $\{(3, 2), (-3, 2), (3, -2), (-3, -2)\}$
14. Yes



15. 6 and -4
16. 

17. 15 kneehole desks and 10 rolltop desks



18. $a = 1; b = -4; c = 0; d = 1$
19. $\begin{bmatrix} 13 & 13 & -15 \\ 37 & 28 & 9 \\ -28 & -21 & -2 \end{bmatrix}$
20. $\begin{bmatrix} 3 & 2 & -6 \\ -31 & -10 & -2 \end{bmatrix}$
21. $\begin{bmatrix} 7 & 6 \\ -1 & 14 \\ -3 & 13 \\ 7 & 14 \end{bmatrix}$
22. AB is 3×4; BA cannot be found
23. does not exist
24. $\begin{bmatrix} 2 & 3 & -2 \\ -1 & -1 & 1 \\ -2 & -4 & 3 \end{bmatrix}$
25. $\left\{\left(\frac{13}{10}, -\frac{1}{10}\right)\right\}$

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CHAPTER 5, FORM E

1. b
2. d
3. c
4. a
5. d
6. c
7. b
8. b
9. d
10. a
11. a
12. b
13. b
14. c
15. a
16. c
17. c
18. d
19. c
20. d
21. c
22. d
23. d
24. a
25. a
26. c
27. d

CHAPTER 5, FORM F

1. b
2. c
3. b
4. a
5. d
6. c
7. b
8. a
9. c
10. a
11. d
12. c
13. b
14. b
15. a
16. c
17. a
18. c
19. d
20. b
21. c
22. d
23. a
24. c
25. d
26. c
27. c

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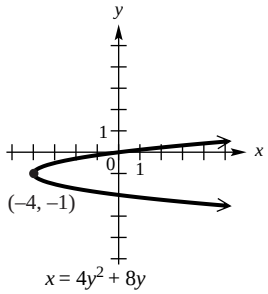
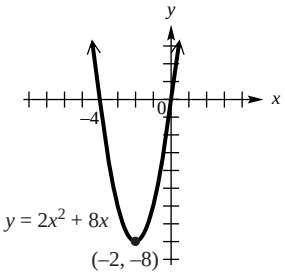
CHAPTER 6, FORM A

1. domain: $[-4,\infty)$; range: $(-\infty,\infty)$; $(-4, -1)$; $y = -1$



$x = 4y^2 + 8y$

2. domain: $(-\infty,\infty)$; range: $[-8,\infty)$; $(-2, -8)$; $x = -2$



$y = 2x^2 + 8x$

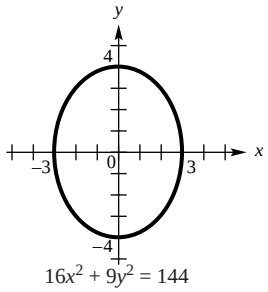
3. $(3, 0)$; $x = -3$

4. $(y-2) = -\frac{2}{9}(x+3)^2$ or

$(x+3)^2 = -\frac{9}{2}(y-2)$

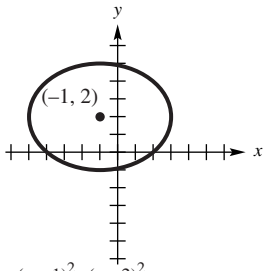
5. $y = \frac{1}{180}x^2$

6. domain: [–3, 3]; range: [– 4, 4]



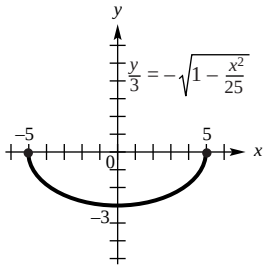
$16x^2 + 9y^2 = 144$

7. domain: [–5, 3]; range: [–1, 5]



$\frac{(x+1)^2}{16} + \frac{(y-2)^2}{9} = 1$

8. a. domain: [–5, 5]; range: [–3, 0]



b. It is the graph of a function.

9. $\frac{x^2}{36} + \frac{y^2}{25} = 1$

10. 12.12 ft

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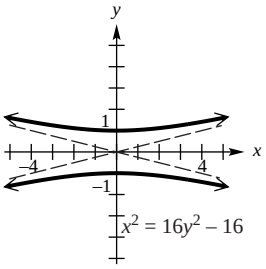
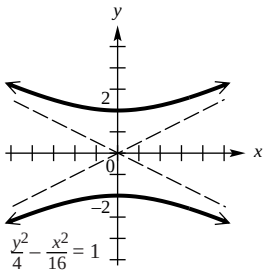
11. domain: $(-\infty,\infty)$; range: $(-\infty,-1]\cup[1,\infty)$;

$y=\pm\frac{1}{4}x$



12. domain: $(-\infty,\infty)$; range: $(-\infty,-2]\cup[2,\infty)$;

$y=\pm\frac{1}{2}x$



13. $\frac{y^2}{49}-\frac{x^2}{4}=1$

14. circle

15. ellipse

16. parabola

17. ellipse

18. parabola

19. hyperbola

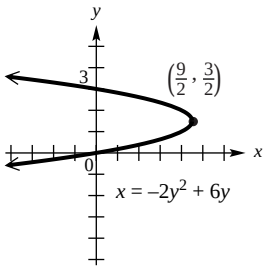
20. $y_1=5+\sqrt{9-(x+4)^2}$

$y_2=5-\sqrt{9-(x+4)^2}$

CHAPTER 6, FORM B

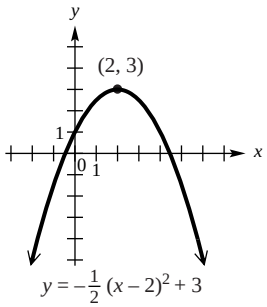
1. domain: $\left(-\infty,\frac{9}{2}\right]$; range: $(-\infty,\infty)$;

$\left(\frac{9}{2},\frac{3}{2}\right)$; $y=\frac{3}{2}$



2. domain: $(-\infty,\infty)$; range: $(-\infty,3]$;

$(2, 3)$; $x = 2$



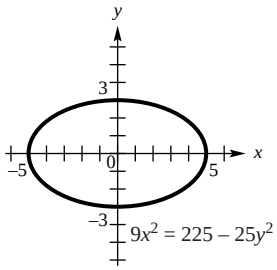
3. $(0,-6)$; $y=6$

4. $y-5=\frac{1}{8}(x-4)^2$ or

$(x-4)^2=8(y-5)$

5. $y=\frac{1}{200}x^2$

6. domain: [–5, 5]; range: [–3, 3]



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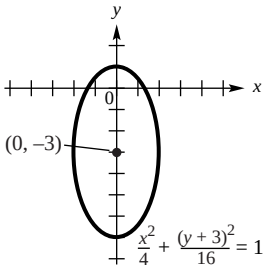
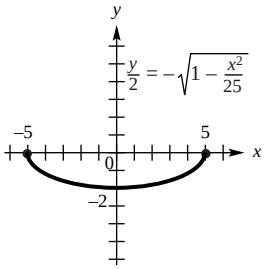
7. domain: [–2, 2]; range: [–7, 1]



8. a. domain: [–5, 5]; range: [–2, 0]

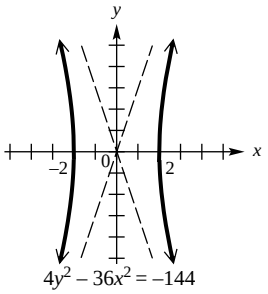


b. It is the graph of a function.

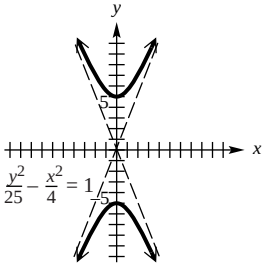
9. $\dfrac{(x+4)^2}{16} + \dfrac{(y-5)^2}{4} = 1$

10. 8.66 m

11. domain: $(-\infty, -2] \cup [2, \infty)$; range: $(-\infty, \infty)$;
$y = \pm 3x$



12. domain: $(-\infty, \infty)$; range: $(-\infty, -5] \cup [5, \infty)$;
$y = \pm\dfrac{5}{2}x$



13. $\dfrac{x^2}{16} - \dfrac{y^2}{9} = 1$

14. circle

15. point

16. ellipse

17. parabola

18. hyperbola

19. parabola

20. $y_1 = 5 + \sqrt{36 - 9(x+3)^2}$
$y_2 = 5 - \sqrt{36 - 9(x+3)^2}$

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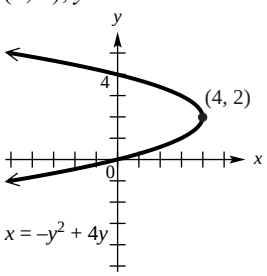
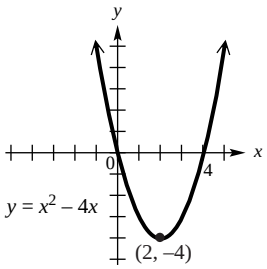
CHAPTER 6, FORM C

1. domain: $(-\infty, 4]$; range: $(-\infty, \infty)$; (4, 2); $y = 2$



2. domain; $(-\infty, \infty)$; range: $[-4, \infty)$; (2, – 4); $x = 2$



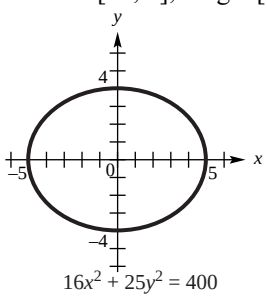
3. $(0, 4)$; $y = -4$

4. $(y-6) = -\frac{3}{4}(x+2)^2$ or

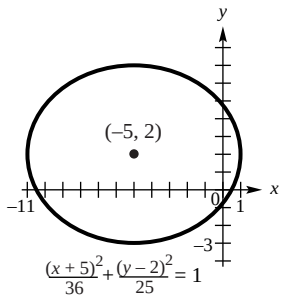
$(x+2)^2 = -\frac{4}{3}(y-6)$

5. $y = \frac{1}{320}x^2$

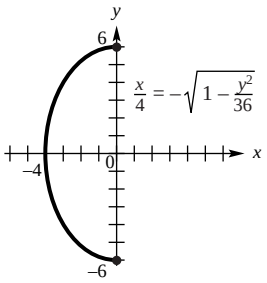
6. domain: [–5, 5]; range: [– 4, 4]



7. domain: [–11, 1]; range: [–3, 7]



8. a. domain: [– 4, 0]; range: [– 6, 6]



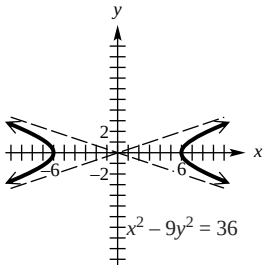
b. It is not the graph of a function.

9. $\frac{(x-3)^2}{64} + \frac{(y+4)^2}{49} = 1$

10. 2.98 m

11. domain: $(\infty, -6] \cup [6, \infty)$; range: $(-\infty, \infty)$;

$y = \pm\frac{1}{3}x$



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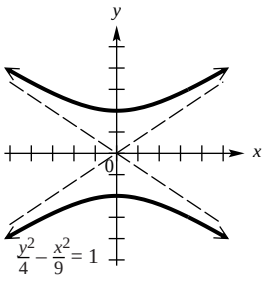
12. domain: $(-\infty,\infty)$; range: $(-\infty,-2]\cup[2,\infty)$;

$y=\pm\frac{2}{3}x$



13. $\frac{y^2}{25}-\frac{x^2}{4}=1$

14. circle

15. hyperbola

16. hyperbola

17. ellipse

18. hyperbola

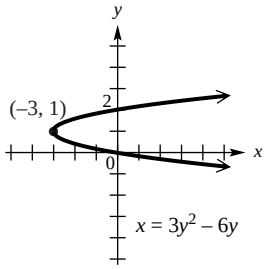
19. parabola

20. $y_1=-1+\sqrt{18-(x+3)^2}$

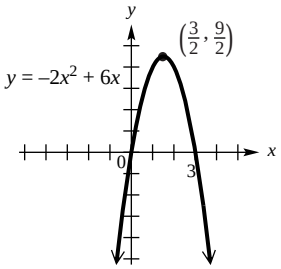
$y_2=-1-\sqrt{18-(x+3)^2}$

CHAPTER 6, FORM D

1. domain: $[-3,\infty)$; range: $(-\infty,\infty)$; $(-3, 1)$; $y = 1$



2. domain: $(-\infty,\infty)$; range: $\left(-\infty,\frac{9}{2}\right]$; $\left(\frac{3}{2},\frac{9}{2}\right)$; $x=\frac{3}{2}$

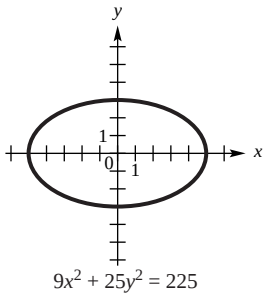


3. $\left(\frac{1}{16}, 0\right)$; $x=-\frac{1}{16}$

4. $x+4=5(y-2)^2$ or $(y-2)^2=\left(\frac{1}{5}\right)(x+4)$

5. $y=\frac{3}{200}x^2$

6. domain: [–5, 5]; range: [–3, 3]



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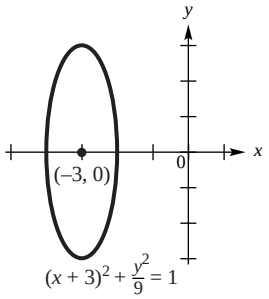
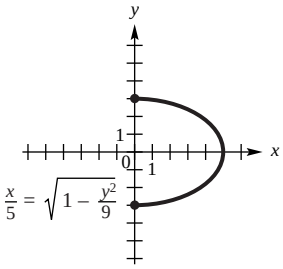
7. domain: [– 4, –2]; range: [–3, 3]



8. a. domain: [0, 5]; range: [–3, 3]

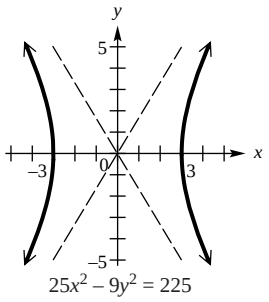


b. It is not the graph of a function.

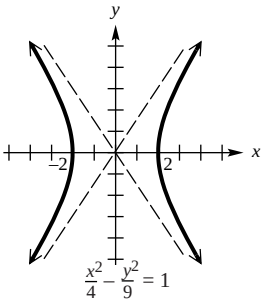
9. $\dfrac{(x+8)^2}{64} + \dfrac{(y-5)^2}{36} = 1$

10. 2.12 ft

11. domain: $(-\infty, -3] \cup [3, \infty)$;
range: $(-\infty, \infty)$;
$y = \pm\dfrac{5}{3}x$



12. domain: $(-\infty, -2) \cup [2, \infty)$;
range: $(-\infty, \infty)$; $y = \pm\dfrac{3}{2}x$



13. $\dfrac{(y-3)^2}{9} - \dfrac{(x-5)^2}{9} = 1$

14. parabola

15. parabola

16. circle

17. hyperbola

18. ellipse

19. ellipse

20. $y_1 = 5\sqrt{16 - x^2}$
$y_2 = -5\sqrt{16 - x^2}$

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CHAPTER 6, FORM E

1. b
2. a
3. d
4. c
5. b
6. d
7. c
8. c
9. d
10. b
11. d
12. c
13. a
14. a
15. a
16. d
17. b
18. c
19. c
20. c

CHAPTER 6, FORM F

1. c
2. a
3. d
4. c
5. b
6. b
7. b
8. b
9. a
10. d
11. c
12. d
13. b
14. c
15. a
16. d
17. d
18. b
19. c
20. c

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CHAPTER 7, FORM A

1. 1, 5, 14, 30, 55; neither

2. $\frac{3}{2}, 2, \frac{5}{2}, 3, \frac{7}{2}$; arithmetic

3. $-2, 4, -8, 16, -32$; neither

4. 5

5. 90

6. 620

7. $\frac{1023}{4}$

8. 75

9. does not exist

10. 120

11. $\frac{144}{5}$

12. $81x^4 - 108x^3 + 54x^2 - 12x + 1$

13. $x^4 - 8x^3y + 24x^2y^2 - 32xy^3 + 16y^4$

14. $37{,}500x^2y^4$

15. 55

16. 15

17. 604,800

18. 40,320

19. Let S_n represent the statement
$6 + 8 + 10 + \cdots + (4 + 2n) = n(n + 5)$.

If $n = 1$, S_n becomes $6 = 1(1 + 5)$, which is true.

The statement S_k is
$6 + 8 + 10 + \cdots + (4 + 2k) = k(k + 5)$.

The statement S_{k+1} is
$6 + 8 + 10 + \cdots + (4 + 2k) + [4 + 2(k + 1)]$
$= (k + 1)[(k + 1) + 5]$.

Assume S_k is true:
$6 + 8 + 10 + \cdots + (4 + 2k) = k(k + 5)$.

Add the $(k + 1)^{st}$-term, $4 + 2(k + 1)$, to both sides of the equation.

$6 + 8 + 10 + \cdots + (4 + 2k) + [4 + 2(k + 1)]$
$= k(k + 5) + [4 + 2(k + 1)]$
$= k^2 + 5k + 4 + 2k + 2$
$= k^2 + 7k + 6$
$= (k + 1)(k + 6)$
$= (k + 1)[(k + 1) + 5]$

It has been shown that if S_k is true, then S_{k+1} is true. Hence S_n is true for every positive integer n.

20. 224

21. 95,040

22. 120

23. 0.25

24. $\frac{1}{13}$

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

26. 2 to 11

27. 0.234

28. 0.0156

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CHAPTER 7, FORM B

1. 1, 2, 3, 5, 8; neither

2. $-1, \frac{1}{4}, -\frac{1}{9}, \frac{1}{16}, -\frac{1}{25}$; neither

3. 0, −3, 8, −15, 24; geometric

4. 44

5. –162

6. 100

7. $\frac{58,025}{576}$

8. –210

9. 180

10. 540

11. does not exist

12. $81x^4 - 216x^3y + 216x^2y^2 - 96xy^3 + 16y^4$

13. $x^4 - 8x^3 + 24x^2 - 32x + 16$

14. $280a^3b^4$

15. 167,960

16. 161,700

17. 259,459,200

18. 720

19. Let S_n represent the statement

$$2 + 8 + 14 + \cdots + (6n - 4) = n(3n - 1).$$

If $n = 1$, S_n becomes $2 = 1(3 \cdot 1 - 1)$, which is true.

The statement S_k is

$$2 + 8 + 14 + \cdots + (6k - 4) = k(3k - 1).$$

The statement S_{k+1} is

$$2 + 8 + 14 + \cdots + (6k - 4) + [6(k + 1) - 4] = (k + 1)[3(k + 1) - 1].$$

Assume S_k is true:

$$2 + 8 + 14 + \cdots + (6k - 4) = k(3k - 1).$$

Add the $(k + 1)^{st}$-term, $6(k + 1) - 4$, to both sides of the equation.

$$2 + 8 + 14 + \cdots + (6k - 4) + [6(k + 1) - 4]$$
$$= k(3k - 1) + 6(k + 1) - 4$$
$$= 3k^2 - k + 6k + 6 - 4$$
$$= 3k^2 + 5k + 2$$
$$= (k + 1)(3k + 2)$$
$$= (k + 1)[3(k + 1) - 1]$$

It has been shown that if S_k is true, then S_{k+1} is true. Hence S_n is true for every positive integer n.

20. 240

21. 6160

22. 720

23. 0.68

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

25. $\frac{1}{13}$

26. 11 to 2

27. 0.00781

28. 0.194

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CHAPTER 7, FORM C

1. 1, 3, 6, 13, 26; neither

2. $-\frac{3}{2}, 3, -6, 12, -24$; geometric

3. $\frac{1}{2}, -\frac{4}{5}, \frac{9}{10}, -\frac{16}{17}, \frac{25}{26}$; neither

4. 25

5. $\frac{3}{16}$

6. 490

7. $\frac{8,717,049}{2048}$

8. –240

9. 34

10. 384

11. 90

12. $16x^4 - 160x^3 + 600x^2 - 1000x + 625$

13. $8x^3 - 36x^2y + 54xy^2 - 27y^3$

14. $210x^5y^5$

15. 125,970

16. 2278

17. 1

18. 40,320

19. Let S_n represent the statement

$$5 + 5^2 + 5^3 + \cdots + 5^n = \frac{5}{4}(5^n - 1).$$

If $n = 1$, S_n becomes $5 = \frac{5}{4}(5^1 - 1)$, which is true.

The statement S_k is

$$5 + 5^2 + 5^3 + \cdots + 5^k = \frac{5}{4}(5^k - 1).$$

The statement S_{k+1} is

$$5 + 5^2 + 5^3 + \cdots + 5^k + 5^{k+1} = \frac{5}{4}(5^{k+1} - 1).$$

Assume S_k is true:

$$5 + 5^2 + 5^3 + \cdots + 5^k = \frac{5}{4}(5^k - 1).$$

Add the $(k+1)^{st}$-term, 5^{k+1}, to both sides of the equation.

$$\begin{aligned} 5 + 5^2 + 5^3 + \cdots + 5^k + 5^{k+1} &= \frac{5}{4}(5^k - 1) + 5^{k+1} \\ &= \frac{5}{4} \cdot 5^k - \frac{5}{4} + 5^{k+1} \\ &= \frac{5^{k+1}}{4} + 5^{k+1} - \frac{5}{4} \\ &= 5^{k+1}\left(\frac{1}{4} + 1\right) - \frac{5}{4} \\ &= 5^{k+1} \cdot \frac{5}{4} - \frac{5}{4} \\ &= \frac{5}{4}(5^{k+1} - 1) \end{aligned}$$

It has been shown that if S_k is true, then S_{k+1} is true. Hence S_n is true for every positive integer n.

20. 2184

21. 3780

22. 5880

23. 0.55

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

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

26. 3 to 1

27. 0.273

28. 0.109

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CHAPTER 7, FORM D

1. 1, 3, 5, 11, 21; neither

2. –4, 2, 8, 14, 20; arithmetic

3. $1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \frac{1}{16}$; geometric

4. 21

5. 27

6. 185

7. $\frac{989,527}{4,374}$

8. $\frac{15,551}{2,520}$

9. does not exist

10. 112,344

11. 72

12. $16x^4+96x^3y+216x^2y^2+216xy^3+81y^4$

13. $x^5-15x^4+90x^3-270x^2+405x-243$

14. $-80a^2b^6$

15. 120

16. 120

17. 32,760

18. 3,628,800

19. Let S_n represent the statement

$$5+8+11+\ldots+(2+3n)=\frac{n(3n+7)}{2}.$$

If $n=1$, S_n becomes $5=\frac{1(3\cdot 1+7)}{2}$, which is true.

The statement S_k is

$$5+8+11+\ldots+(2+3k)=\frac{k(3k+7)}{2}.$$

The statement S_{k+1} is

$$5+8+11+\ldots+(2+3k)+[2+3(k+1)]=\frac{(k+1)[3(k+1)+7]}{2}.$$

Assume S_k is true:

$$5+8+11+\ldots+(2+3k)=\frac{k(3k+7)}{2}.$$

Add the $(k+1)^{st}$-term, $2+3(k+1)$, to both sides of the equation.

$$\begin{aligned}
&5+8+11+\ldots+(2+3k)+[2+3(k+1)]\\
&=\frac{k(3k+7)}{2}+[2+3(k+1)]\\
&=\frac{3k^2+7k}{2}+2+3k+3\\
&=\frac{3k^2+7k}{2}+3k+5\\
&=\frac{3k^2+7k}{2}+\frac{6k+10}{2}\\
&=\frac{3k^2+13k+10}{2}\\
&=\frac{(k+1)(3k+10)}{2}\\
&=\frac{(k+1)[3(k+1)+7]}{2}
\end{aligned}$$

It has been shown that if S_k is true, then S_{k+1} is true. Hence S_n is true for every positive integer n.

20. 77,520

21. 720

22. 270

23. 0.60

24. $\frac{1}{13}$

25. $\frac{4}{13}$

26. 25 to 1

27. 0.161

28. 0.00322

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CHAPTER 7, FORM E

1. d
2. b
3. c
4. a
5. d
6. c
7. c
8. a
9. c
10. a
11. a
12. b
13. a
14. c
15. b
16. a
17. b
18. d
19. a
20. a
21. c
22. d
23. b
24. d
25. d
26. a
27. d
28. a
29. a
30. b

CHAPTER 7, FORM F

1. a
2. d
3. a
4. c
5. c
6. d
7. a
8. a
9. b
10. b
11. d
12. a
13. d
14. d
15. a
16. c
17. b
18. b
19. c
20. c
21. c
22. b
23. b
24. c
25. d
26. d
27. a
28. a
29. a
30. c

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