

**CHAPTER 2, FORM C
COLLEGE ALGEBRA**

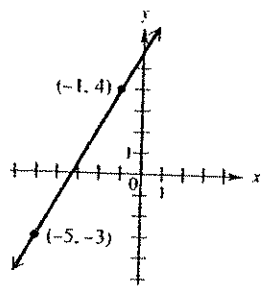
NAME _____
DATE _____

I. 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 $f(x) = \sqrt{x+4}$ | B. $[4, \infty)$ |
| c. Domain of $f(x) = x^2 - 16$ | 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) = x+3 $ | G. $[-1, \infty)$ |
| h. Range of $f(x) = x - 3$ | H. $[-4, \infty)$ |
| i. Domain of $y = x^2 - 3$ | |
| j. Range of $y = 2x^2$ | |

- I. 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 1-6.



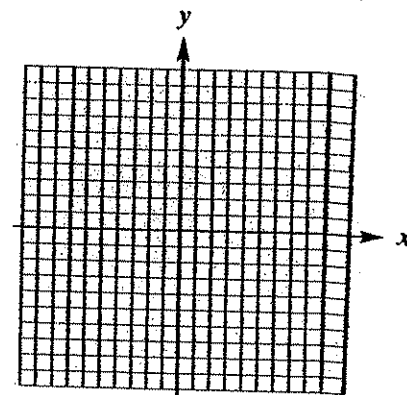
2. What is the slope of the line? 2. _____
 3. What is the distance between the two points shown? 3. _____
 4. What are the coordinates of the midpoint of the segment joining the two points? 4. _____
 5. Find the standard form of the equation of the line. 5. _____
 6. Write the linear function $f(x) = ax + b$ that has this line as its graph. 6. _____

1

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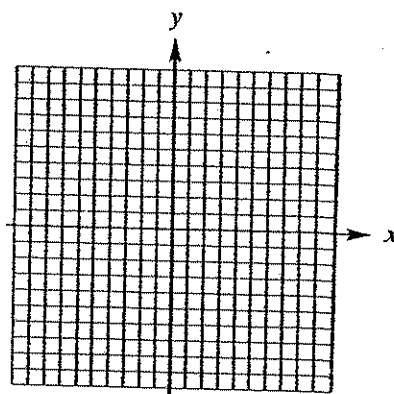
12. $f(x) = [x] + 2$

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 $y = 2|x+3| + 1$ can be obtained from the graph of $y = |x|$.

14.

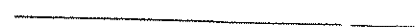
15. Determine whether the graph of $3x - 4y^2 = 5$ is symmetric with respect to

- the x -axis,
- the y -axis,
- the origin.

15. a.



b.



c.



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

16. $(g - f)(x)$

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

17. $(fg)(x)$

21. $\left(\frac{f}{g}\right)(-2)$

18. $f(-2)$

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

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

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6. Use the factor theorem to determine whether the polynomial $x + 2$ is a factor of $4x^4 - 3x^3 + 2x^2 - 5x + 8$. If it is, what is the other factor? If it is not, explain why.
7. Find all zeros of $f(x)$, given that $f(x) = x^4 + 3x^3 - 16x^2 - 48x$ and -4 is one zero.
8. $f(x)$ is a fourth degree polynomial having only real coefficients. It has 3 and -4 as zeros, and the point $(-3, -120)$ lies on the graph. Find $f(x)$.
9. Explain why the polynomial function defined by $f(x) = x^6 + 4x^4$ has only one real zero.
10. Consider the function defined by $f(x) = 2x^3 + 5x^2 - 7x + 1$.
- Use the intermediate value theorem to show that f has a zero between -3 and -4 .
 - Use a graphing calculator to find all real zeros to as many decimal places as the calculator will give.
11. Graph the functions defined by $f_1(x) = x^4$ and $f_2(x) = \frac{1}{2}(x + 2)^4 - 1$ on the same axes. Explain how the graph of f_2 can be obtained by a translation of the graph of f_1 .

6. _____

7. _____

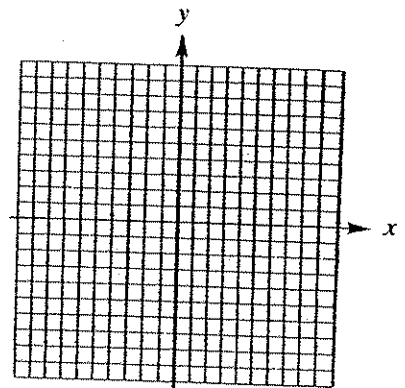
8. _____

9. _____

10. a. _____

b. _____

11.

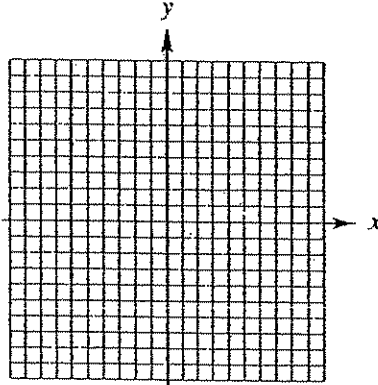


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20. For the rational function defined by $f(x) = \frac{x^2 + 2x - 8}{x + 3}$,

- determine the equation of the oblique asymptote;
- determine the x -intercepts;
- determine the y -intercept;
- determine the equation of the vertical asymptote;
- sketch the graph.

20. a. _____
 b. _____
 c. _____
 d. _____
 e.



21. The power required to run a ship varies directly as the cube of the speed. If a ship requires 3000 horsepower for a speed of 5 mph, what horsepower would be required for a speed of 10 mph?

21. _____

22. The elongation in a wire when a mass is hung at its free end varies jointly as the mass and the length of the wire and inversely as the cross-sectional area of the wire. The elongation is .0072 cm when a mass of 160 gm is attached to a wire 330 cm long, with a cross-sectional area of .4 sq cm. Find the elongation if a mass of 120 gm is attached to the same wire.

22. _____

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

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.

a. $5x - y = 17$

b. $5x + y = -17$

c. $x - 5y = 13$

d. $x + 5y = -13$

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

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

b. $f(x) = -5x + 17$

c. $f(x) = 5x - 17$

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

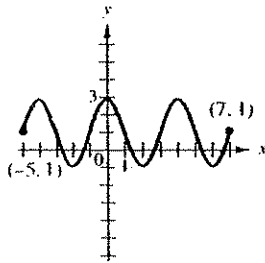
4. _____

5. _____

6. _____

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

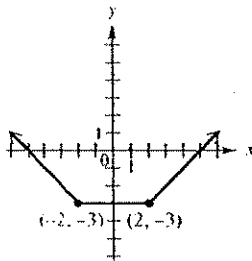
7.



- 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: $[-1, 3]$

7. _____

8.



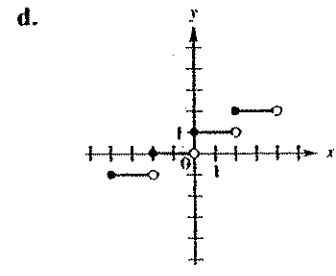
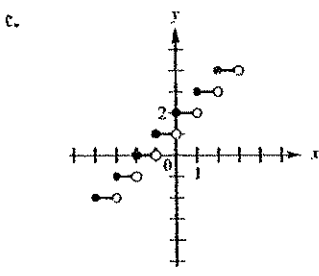
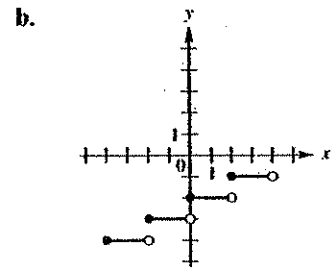
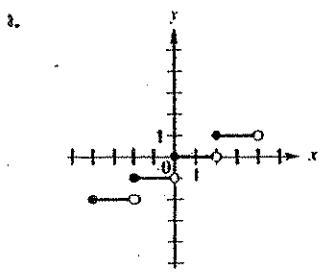
- a. Not a function; domain: $(-\infty, \infty)$; range: $[-2, \infty)$
 b. Not a function; domain: $[-5, 5]$; range: $[-3, \infty)$
 c. Function; domain: $(-\infty, \infty)$; range: $[-2, \infty)$
 d. Function; domain: $(-\infty, \infty)$; range: $[-3, \infty)$

8. _____

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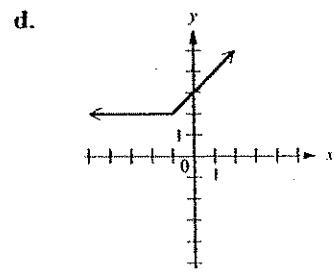
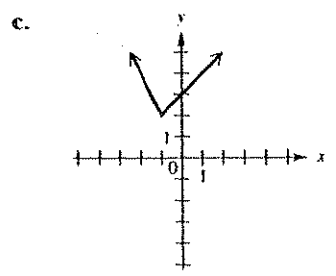
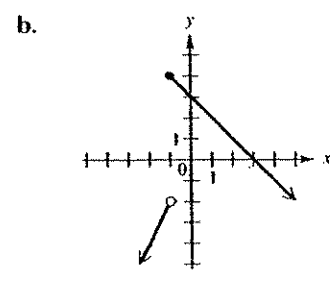
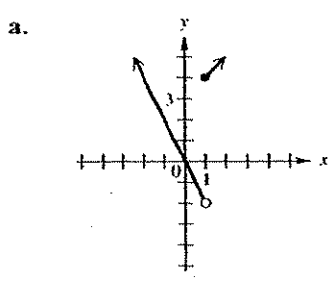
12. $f(x) = \left\lfloor \frac{1}{2}x \right\rfloor - 2$

12. _____



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

13. _____



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

14. _____

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

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Choose the best answer.

1. Give the axis and vertex of the graph of $f(x) = 4x^2 - 12x + 2$.
- Axis: $x = 3$; vertex: $(3, 2)$
 - Axis: $x = 3$; vertex: $(3, -7)$
 - Axis: $x = \frac{3}{2}$; vertex: $(\frac{3}{2}, 2)$
 - Axis: $x = \frac{3}{2}$; vertex: $(\frac{3}{2}, -7)$

2. The height in feet of an object thrown upward is given by the equation $h = 48t - 16t^2$, where h is the height of the object after t seconds. Find the maximum height the object reaches.
- $\frac{3}{2}$ ft
 - 36 ft
 - 48 ft
 - 144 ft

3. Use synthetic division to perform the division.

$$\begin{array}{r} 2x^3 - 11x^2 + 28 \\ x - 5 \end{array}$$

- $2x^2 - x + \frac{23}{x-5}$
- $2x - 1 + \frac{23}{x-5}$
- $2x^2 - x - 5 + \frac{-3}{x-5}$
- $2x^2 - x - 5 + \frac{3}{x-5}$

4. Use synthetic division to determine $f(-2)$, if

$$f(x) = 5x^3 + 3x^2 - 21x - 1.$$

- 9
- 13
- 93
- 12

5. Which of the following is a factor of

$$5x^3 - 9x^2 + x + 219?$$

- $x + 3$
- $x + 73$
- $x - 73$
- $x - 3$

6. Use synthetic division to determine the remainder r : $\frac{2x^5 + 3x^3 - 2x^2 + 1}{x - 2}$

- 1
- 25
- 81
- 95

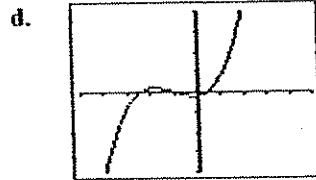
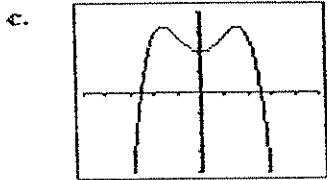
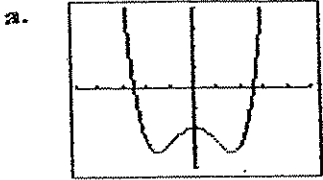
7. Find all rational zeros of the function $f(x) = 6x^3 + 11x^2 - 3x - 2$.

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

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12. Use end behavior to determine which of the following graphs is that of $f(x) = x^3 - 3x^2 + x + 1$.

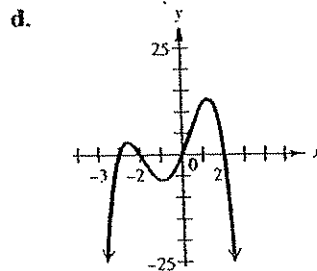
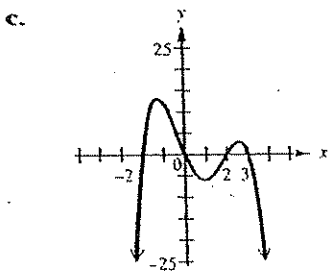
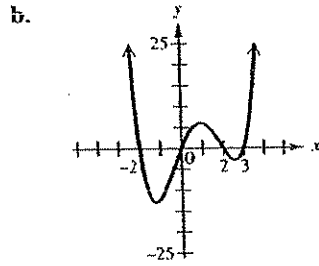
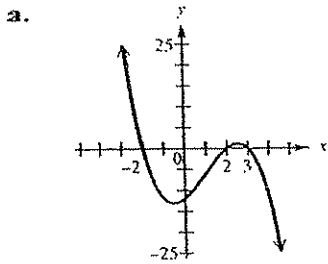
12. _____



graph each polynomial function.

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

13. _____



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17. Which one of the functions defined below has a graph with no y-intercept?

a. $f(x) = \frac{2}{x-3}$

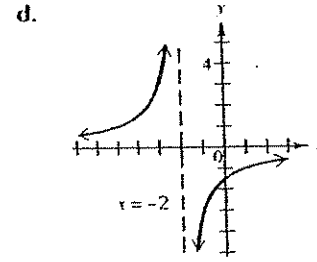
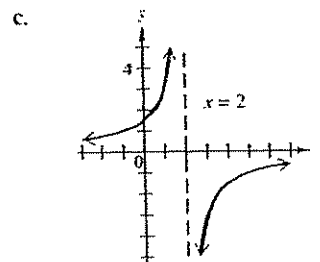
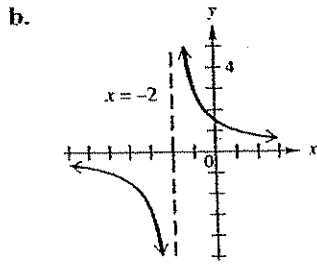
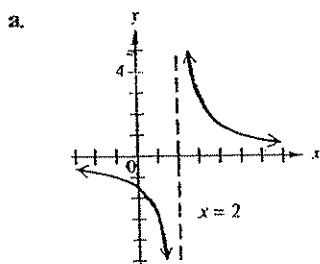
b. $f(x) = \frac{x+3}{x-2}$

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

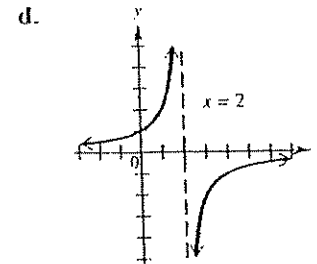
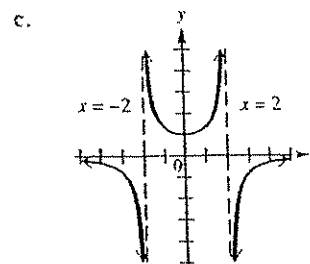
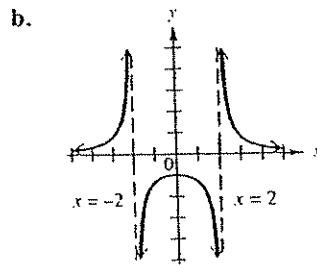
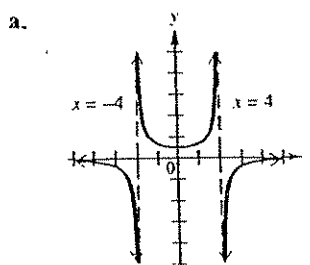
d. $f(x) = \frac{x^2-3}{x^2}$

Graph each rational function.

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



19. $f(x) = \frac{-4}{x^2-4}$



17. _____

18. _____

19. _____

CHAPTER 2, FORM C

1. a. H
- b. B
- c. A
- d. G
- e. A
- f. A
- g. A
- h. F
- i. A
- j. D

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. Not a function; domain: $(-7, \infty)$;
range: $(-7, \infty]$

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

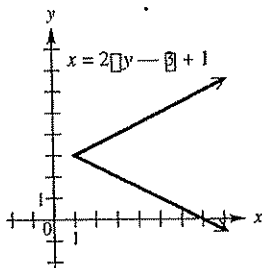
9. a. $x = \sqrt{2}$

b. $y = -5$

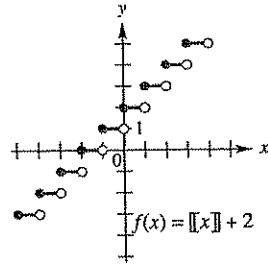
10. a. $y = \frac{2}{3}x + \frac{16}{3}$

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

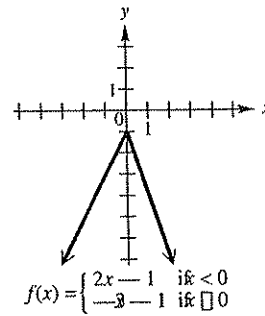
11.



12.



13.



14. Translate the graph of $y = |x|$ to the left 3 units, shrink by a factor of 2, and translate 1 unit up.

15. a. Yes b. No c. No

16. $3x^2 - 4x - 4$

17. $6x^3 + 5x^2 - 8x - 3$

18. 15

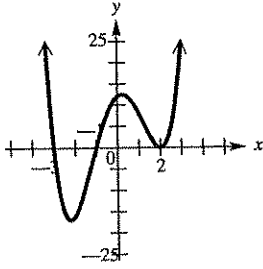
19. $6x + 3h - 2$

20. 2

21. -15

22. $12x^2 + 32x + 20$

15.

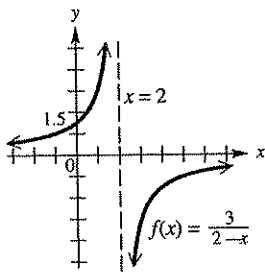


$$f(x) = (x+3)(x+1)(x-2)^2$$

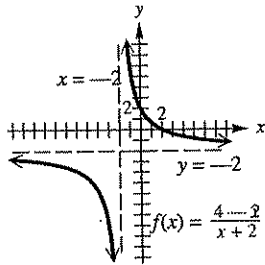
16. $f(x) = -\frac{1}{6}x(x-6)(x+3)$

17. About 17.5 sec.

18.



19.



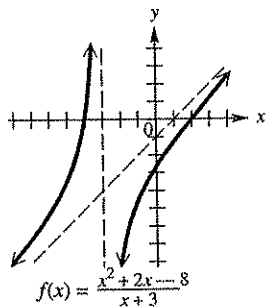
20. a. $y = x - 1$

b. $-4, 2$

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

d. $x = -3$

e.



21. 24,000 horsepower

22. .0054 cm

CHAPTER 2 FORM F

1a. c

1b. a

1c. a

1d. c

1e. b

2. c

3. b

4. d

5. c

6. a

7. a

8. d

9. d

10. b

11. a

12. b

13. c

14. c

15. d

16. c

17. a

18. b

19. d

20. a

21. d

22. c

CHAPTER 3, FORM F

1. d

2. b

3. d

4. b

5. a

6. c

7. d

8. b

9. a

10. a

11. c

12. b

13. b

14. b

15. b

16. c

17. d

18. d

19. c

20. b

21. d

22. b