

MAT 1033

Final Review

A. Acosta

1. Evaluate the polynomial function:

$$f(x) = 2x^2 - 3x + 8 \text{ for } x = -3$$

Choose the answer from the following.

- a. 18
- b. 1
- c. 17
- d. 35

2. Factor by grouping $x^2 - 16x + 15xy - 240y$.

Choose the answer from the following:

- a. $(x - 15y)(x - 17)$
- b. $(x + 17y)(x + 18)$
- c. $(x - 16y)(x + 16)$
- d. $(x + 15y)(x - 16)$

3. Solve the equation $x - 2 = \sqrt{2x + 76}$. Give the apparent solutions. Cross out the wrong one. Choose the answer from the following:

- a. 84
- b. 11
- c. 12
- d. -11
- e. no solutions
- f. 10

4. Solve the inequality: $32x > 64$.

Select the correct answer:

- a. $(2, \infty)$
- b. $(-2, 2)$
- c. $(-\infty, 2)$

5. What is the numerator and what is the denominator of the following complex fraction?

$$\frac{5 - k - \frac{2}{k}}{\frac{5}{k^2} + \frac{17}{k} - 17}$$

- a. Numerator: $7k^2 - k^3 + 2k$; Denominator: $5 + 17k - 19k^3$
- b. Numerator: $9k^2 - k^3 + 2k$; Denominator: $5 - 20k + 17k$
- c. Numerator: $5k^2 - k^3 - 2k$; Denominator: $5 + 17k - 17k^2$
- d. Numerator: $6k^3 - k^2 - 2k$; Denominator: $5 + 18k - 17k^2$

6. Use the quadratic formula and a scientific calculator to solve the equation $-5.3x^2 + 5.1x + 2.7 = 0$. Give the answers to the nearest hundredth. Choose the correct answer from the following:

- a. -0.38, -1.34
- b. 0.38, 1.34
- c. -0.38, 1.34
- d. 1.34, -1.34
- e. -0.38, 0.38

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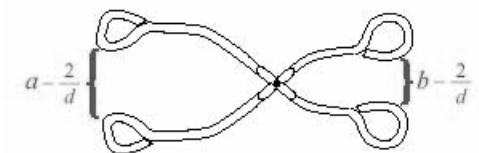
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7. The denominators of two fractions are $x^3 + 1$ and $x^2 + 2x + 1$. Find the LCD.

Choose the answer from the following:

- a. $(x-1)^3$
- b. $(x^3 + 1)(x+1)$
- c. $x^3 - 1$
- d. $(x+1)^3$

8. What is the ratio of the width of the opening of the ice tongs to the width of the opening of the handles? Express the result in simplest form. Let $a = 14$, $b = 6$.

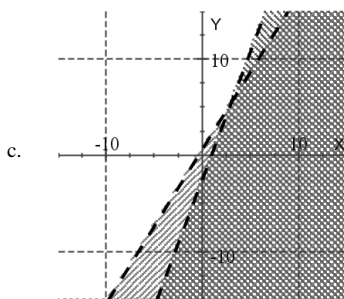
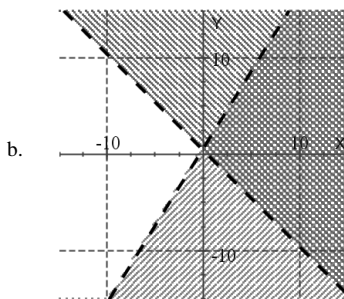
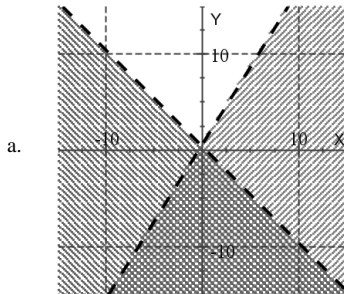


- a. $\frac{7d - 3}{3d - 1}$
- b. $\frac{d - 1}{3d + 1}$
- c. $\frac{7d - 1}{3d - 1}$
- d. $\frac{3d + 1}{7d + 1}$

9. Graph the solution set of:

$$\begin{cases} -8x + 5y < 4 \\ 5x + 5y < 2 \end{cases}$$

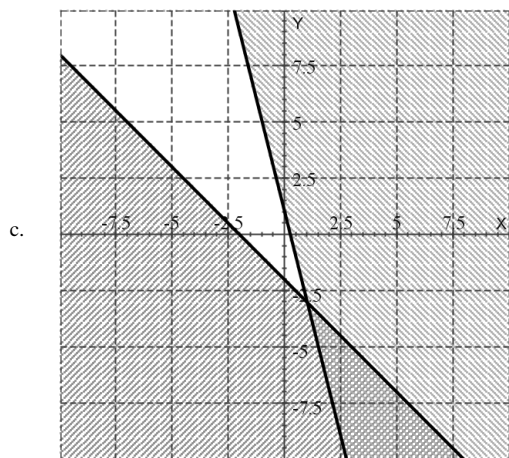
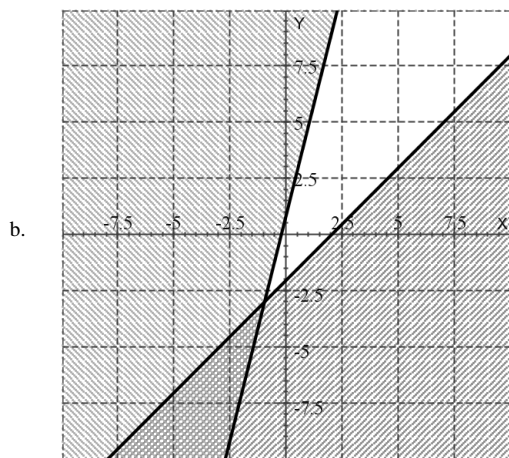
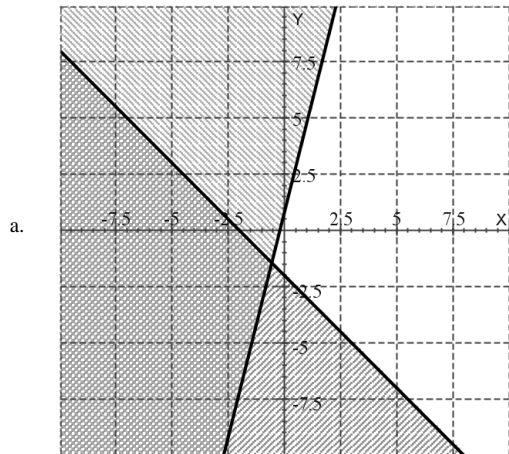
Select the correct answer:



10. Find the solution set of:

$$\begin{cases} y \leq x - 2 \\ y \geq 4x + 1 \end{cases}$$

Select the correct answer:



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11. Simplify the expression $(-3\sqrt[3]{6x+4})^3$. Choose the answer from the following:

- a. $18x + 108$
- b. $-5832x - 1728$
- c. $5832x + 1728$
- d. $-18x - 108$
- e. $162x + 108$
- f. $-162x - 108$

12. Use the quadratic formula to solve the equation: $11x + 4 = 20x^2$.
Choose the correct answer from the following:

- a. $\frac{1}{5}, -\frac{1}{4}$
- b. $\frac{4}{5}, -\frac{1}{4}$
- c. $\frac{1}{5}, \frac{1}{4}$
- d. $\frac{4}{5}, \frac{1}{4}$

13. Simplify the expression $\frac{\sqrt{8an^2r}}{\sqrt{16anr}}$ by rationalizing the denominator. All variables represent positive real numbers. Choose the correct answer from the following:

- a. $\frac{\sqrt{a}}{2n}$
- b. $\frac{\sqrt{2n}}{2}$
- c. $\frac{\sqrt{2a}}{2}$

14. The muzzle velocity of a cannon is 304 feet per second. If a cannonball is fired vertically, at what times will it be at the height of 1408 feet?
Note: Use the formula $h = vt - 16t^2$ where h is the height in feet, v is the velocity in feet per second and t is the time in seconds.

- a. 12 sec., 9 sec.
- b. 13 sec., 10 sec.
- c. 14 sec., 11 sec.
- d. 11 sec., 8 sec.

15. Factor the polynomial.

$$16z^4 - 256d^4$$

- a. $(4z^2 + 16d^2)^2$
- b. $(4z - 16d)^2(2z + 4d)(2z - 4d)$
- c. $(4z^2 + 16d^2)(2z + 4d)(2z - 4d)$

16. The prime factorizations of three monomials are shown:

$$\begin{aligned} &5 \cdot 5 \cdot 7 \cdot y \cdot y \cdot b \cdot b \cdot b, \\ &5 \cdot 7 \cdot 7 \cdot y \cdot b \cdot b \cdot b \cdot b, \\ &5 \cdot 7 \cdot 7 \cdot 3 \cdot y \cdot y \cdot y \cdot b \cdot b \end{aligned}$$

Find their GCF. Choose the answer from the following:

- a. $35y^2b$
- b. $35yb^2$
- c. $35yb^3$
- d. $3675y^3b^3$

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17. Use the square root property to solve the equation $x^2 = 9$. Choose the answer from the following:

- a. $x = 9, x = -9$
- b. $x = 2, x = -4$
- c. $x = 5, x = 0$
- d. $x = 3, x = -3$

18. Solve the equation.

$$x^3 + 17x^2 + 72x = 0$$

- a. 10, 11, 0
- b. 7, 9, 9
- c. 9, -10, -10
- d. -8, -9, 0

19. Rationalize the numerator in $\frac{\sqrt{2} - 1}{1}$. Choose the correct answer from the following:

- a. $\frac{1}{1(\sqrt{2} + 1)}$
- b. $\frac{1}{2\sqrt{1} + 1}$
- c. $\frac{1}{\sqrt{2} - 1}$

20. The costs incurred by a trucking company vary jointly with the number of trucks in service and the number of hours they are used. When 5 trucks are used 7 hours each, the costs are \$3150. Find the costs of using 13 trucks, each for 12 hours.

- a. \$70200
- b. \$14040
- c. \$37800
- d. \$40950

21. The length of time that a given number of bushels of corn will last when feeding cattle varies inversely with the number of animals. If x bushels will feed 15 cows for 12 days, how long will the feed last for 20 cows?

- a. 4.5
- b. 9
- c. 45
- d. 18

22. Simplify the expression: $(x + 6) \cdot \frac{1}{x^2 + 13x + 42}$.

- a. $\frac{1}{x - 7}$
- b. $\frac{1}{x + 8}$
- c. $x + 7$
- d. $x + 8$
- e. $\frac{1}{x + 7}$

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23. Simplify the complex fraction

$$\frac{\frac{4}{27}}{\frac{4}{3}}$$

- a. $\frac{1}{3}$
- b. $\frac{1}{9}$
- c. $\frac{3}{11}$
- d. $\frac{2}{10}$

24. The denominators of two fractions are $32a^2b$ and $20ab^2$. Find the LCD. Choose the answer from the following:

- a. $40a^2b^2$
- b. $4ab$
- c. $160a^2b^2$
- d. $640a^3b^3$

25. Solve the equation by completing the square: $6x^2 - 60x - 144 = 0$. Choose the answer from the following:

- a. $x = 12, x = -2$
- b. $x = -60, x = -6$
- c. $x = 12, x = 0$
- d. $x = -12, x = 2$

26. Simplify the expression: $[(x + 6)^{1/5}]^5$. Choose the correct answer from the following.

- a. $\sqrt{x + 6}$
- b. $x + 6$
- c. $\frac{1}{x + 6}$
- d. $\frac{1}{\sqrt{x + 6}}$

27. Do the addition.

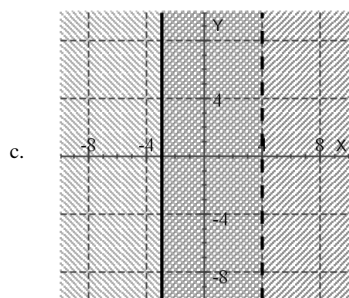
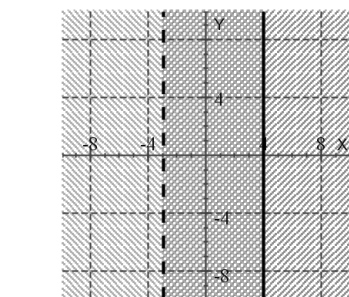
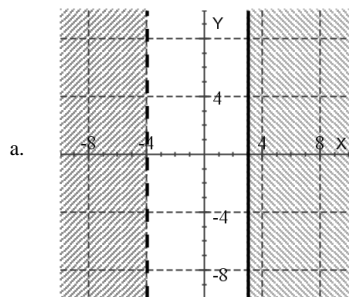
$$\begin{array}{r} 6a^3 + 5a^2 + 8 \\ + -3a^3 + 9a - 6 \\ \hline 3a^3 - 2a^2 + 8a + 9 \end{array}$$

Choose the answer from the following.

- a. $6a^3 + 17a^2 + 3a + 11$
- b. $6a^3 - 3a^2 - 17a + 11$
- c. $12a^3 + 7a^2 + 17a + 23$
- d. $6a^3 + 3a^2 + 17a + 11$

28. Select the correct graph of the following compound inequality:

$$-3 \leq x < 4$$



29. If a polynomial is divided by $8a - 7$ and the quotient is $5a + 10$ with a remainder of 5, how should the result look? Choose the answer from the following:

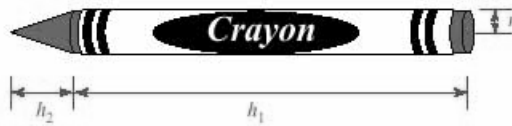
- a. $5a + 10 + \frac{8a - 7}{5}$
- b. $5a + 10 + 5$
- c. $5a + 10 + \frac{5}{8a - 7}$
- d. $8a - 7 + \frac{5}{5a + 10}$

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30. The amount of colored wax used to make the crayon shown in the figure below can be found by computing its volume using the formula $V = \pi r^2 h_1 + \frac{1}{3} \pi r^2 h_2$. Factor the expression on the right-hand side of this equation. Let $r = 4$.



Choose the answer from the following.

- a. $V = 16 (h_2 + \frac{1}{3} h_1)$
 - b. $V = 25 \pi (h_1 + \frac{1}{3} h_2)$
 - c. $V = 25 \pi (h_1 - \frac{1}{3} h_2)$
 - d. $V = 16 \pi (h_1 + \frac{1}{3} h_2)$
31. Rationalize the denominator and simplify the radical expression: $\frac{\sqrt[3]{4x}}{\sqrt[3]{2xb}}$ All variables represent positive real numbers. Choose the correct answer from the following:

- a. $\frac{\sqrt[3]{2b}}{b^2}$
- b. $\frac{\sqrt{2b^3}}{b}$
- c. $\frac{\sqrt[3]{2b^2}}{b}$

32. Solve the formula for x :

$$S = \frac{b - mx}{1 - x}$$

- a. $x = \frac{b + S}{S - m}$
- b. $x = -\frac{S - b}{S - m}$
- c. $x = \frac{b - S}{S + m}$
- d. $x = \frac{S - b}{S - m}$

33. Solve the expression and choose the correct answer.

$$\frac{11}{i^{11}}$$

- a. 11
- b. -11
- c. -11i
- d. $\frac{11}{-i}$
- e. 11i
- f. $\frac{11}{i}$

34. Simplify and combine like radicals $\sqrt[3]{-750} + \sqrt[3]{162}$.

- a. $2\sqrt[3]{6}$
- b. $-2\sqrt[3]{6}$
- c. $8\sqrt[3]{-6}$
- d. $-8\sqrt[3]{6}$

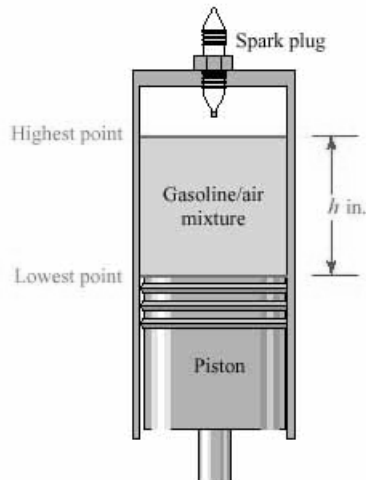
35. Do the operations and simplify: $(3x + 18) \cdot \frac{x^2}{3x - 9} \div \frac{1}{x - 3}$.

- a. $x + 6$
- b. $x^2(x + 6)$
- c. $x^2(x - 6)$
- d. $x - 6$

36. Complete the square to solve the equation $8r^2 - 40r + 48 = 0$. Choose the answer from the following:

- a. $r = -2, r = -3$
- b. $r = -6, r = 0$
- c. $r = 5, r = 48$
- d. $r = 2, r = 3$

37. As the piston shown in the illustration moves upward, it pushes a "cylinder" of gasoline/air mixture that is ignited by the spark plug. The formula that gives the volume of a cylinder is $V = \pi r^2 h$ where r is the radius and h the height. Find the radius of the piston (to the nearest hundredth of an inch) if it displaces 45.98 cubic inches of gasoline/air mixture as it moves from its lowest to its highest point. Let $h = 4.59$ inches. Choose the answer from the following:



- a. $r = 2.09$ inches
 b. $r = 1.89$ inches
 c. $r = 1.79$ inches
 d. $r = 47.77$ inches
38. Factor the polynomial.

$$z^2 + 6z + 9 - c^8$$

- a. $(3 + z - c^8)(z + 3 + 1)$
 b. $(3 + z - c^4)(z + 3 + c^4)$
 c. $(3 + z - c^4)(z - 3 + c^4)$
39. Factor the polynomial:

$$216a^3 - 64b^6$$

- a. $(6a - 4b^2)(36a^2 + 24ab^2 - 16b^4)$
 b. $(6a + 4b^2)(36a^2 + 24ab^2 - 16b^4)$
 c. $(6a - 4b^2)(36a^2 + 24ab^2 + 16b^4)$
 d. $(6a + 4b^2)(36a^2 - 24ab^2 - 16b^4)$
40. Find the prime-factored form of the number:

110

Choose the answer from the following.

- a. $2 \cdot 55$
 b. $22 \cdot 5$
 c. $2 \cdot 2 \cdot 11$
 d. $2 \cdot 5 \cdot 11$

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41. Rationalize the numerator in $\frac{\sqrt{z} - \sqrt{m}}{\sqrt{z} + \sqrt{m}}$. All variables represent positive numbers. Choose the correct answer from the following:

- a. $\frac{z - m}{z + 2\sqrt{zm} + m}$
- b. $\frac{z + m}{z - 2\sqrt{zm} + m}$
- c. $\frac{z - 2\sqrt{zm} + m}{z - m}$
- d. $\frac{z - m}{z - 2\sqrt{zm} + m}$
- e. $\frac{z - 2\sqrt{zm} + m}{z + 2\sqrt{zm} + m}$
- f. $\frac{z - 2\sqrt{zm} + m}{z + m}$

42. Insert one of the following to make the statement true.

$$8x^2y - 6x + 16y \text{ is a } \underline{\hspace{2cm}}$$

- a. monomial
- b. binomial
- c. trinomial
- d. none of these

43. Do the division $\frac{35x^5y^6}{5x^9y^2}$.

Choose the answer from the following:

- a. $\frac{7y^4}{x^4}$
- b. $\frac{7x^4}{y^4}$
- c. $7y^4x^{-4}$
- d. $7y^4x^4$

44. Simplify the expression: $(4x^2)^{1/2}$. Assume that all variables are unrestricted. Use absolute value symbols if necessary. Choose the correct answer from the following.

- a. $-2x$
- b. $2x$
- c. $2|x|$

45. Numbers such as 9, 16, 81, 144, and 169 are called perfect _____. Choose the correct answer from the following.

- a. squares
- b. cubes
- c. square roots
- d. cube roots

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46. Solve the equation:

$$\frac{x+3}{x+8} - \frac{x-4}{x-6} = 0$$

- a. $x = \frac{-14}{-7}$
- b. $x = \frac{-14}{5}$
- c. $x = \frac{50}{-7}$
- d. $x = \frac{-14}{21}$
- e. no solution
- f. $x = \frac{50}{21}$

47. Solve the equation:

$$\frac{x}{x+6} = 1 - \frac{12x + -23}{x^2 + 12x + 36}$$

- a. $x = \frac{13}{6}$
- b. $x = \frac{59}{6}$
- c. $x = \frac{59}{18}$
- d. $x = \frac{13}{18}$

48. The recommended child's dose of the sedative hydroxine is 0.009 gram per kilogram of body mass. Find the dosage for a 24-kg child.

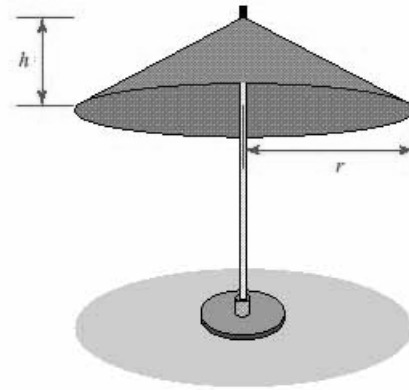
Choose the answer from the following:

- a. 0.216 mg
- b. 24 mg
- c. 0.009 mg
- d. 216 mg
- e. 0.24 mg

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49. The surface area of a cone is given by the formula $S = \pi r \sqrt{r^2 + h^2}$ where r is the radius of the base and h is its height. Use this formula to find the number of square feet of waterproof cloth used to make the umbrella shown in the illustration if $r = 11$ and $h = 4$.



- a. $11\pi\sqrt{137}$
 b. $22\pi\sqrt{137}$
 c. $11\pi^3\sqrt{137}$
50. Do the operation: $-\frac{12}{13} \div \frac{96}{91}$.

- a. $1\frac{1}{7}$
 b. $-1\frac{1}{7}$
 c. $-\frac{7}{8}$
 d. $\frac{7}{8}$

51. Solve the inequality: $-4t + 31 \leq -7$.

Select the correct answer:

- a. $[9.5, \infty)$
 b. $[-9.5, 9.5]$
 c. $(-\infty, 9.5]$

52. Simplify the expression: $\frac{x^2 - 16}{x^2 - 49} \div \frac{x + 4}{x - 7}$.

- a. $\frac{x - 4}{x + 7}$
 b. $\frac{x - 7}{x + 4}$
 c. $\frac{x + 4}{x + 7}$
 d. $\frac{x + 4}{x - 7}$

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53. Factor the expression $2(m + n + p) + x(m + n + p)$.

Choose the answer from the following:

- a. $(1 + m)(x + n - p)$
- b. $(2 + x)(m + n + p)$
- c. $(2 + p)(m - n - x)$
- d. $(3 + n)(m - x + p)$

54. Solve the equation:

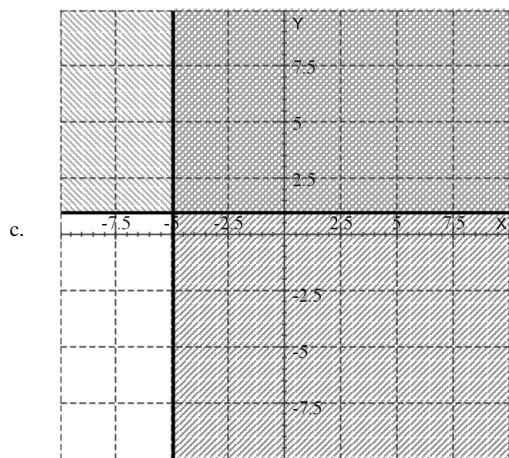
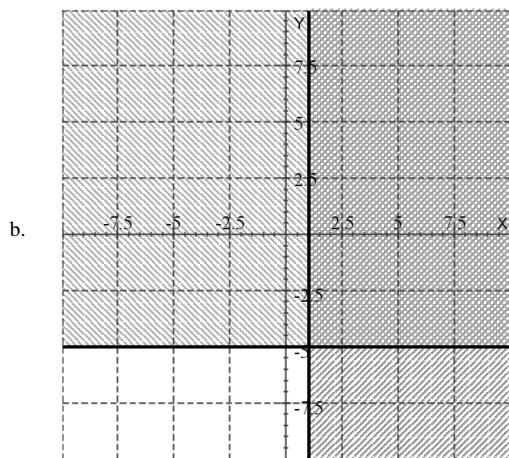
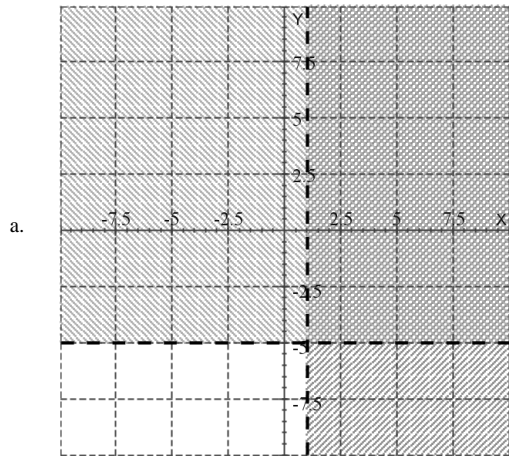
$$\frac{1}{y + 2} + \frac{3}{2} = 7$$

- a. $\frac{24}{11}$
- b. $\frac{-20}{11}$
- c. no solution
- d. $\frac{-20}{17}$

55. Graph the solution set of:

$$\begin{cases} x > 1 \\ y > -5 \end{cases}$$

Select the correct answer:



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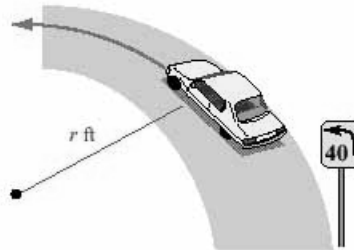
56. Use the square root property to solve the equation $6x^2 - 54 = 0$. Choose the answer from the following:

- a. $x = 54, x = -54$
- b. $x = 6, x = -6$
- c. $x = 3, x = 0$
- d. $x = 3, x = -3$

57. Use factoring to solve the equation $9z^2 = 153z - 540$. Choose the answer from the following:

- a. $z = -12, z = -5$
- b. $z = 9, z = -9$
- c. $z = 12, z = 5$
- d. $z = 153, z = 0$

58. A curved concrete road will accommodate traffic speed of s mph if the radius of the curve is r feet, according to the formula $s = 3\sqrt{r}$. If engineers expect 40-mph traffic, what radius should they specify? Round the result to the nearest foot.



Choose the answer from the following:

- a. 2370 feet
- b. 64000 feet
- c. 64 feet
- d. 4 feet
- e. 178 feet
- f. 10 feet

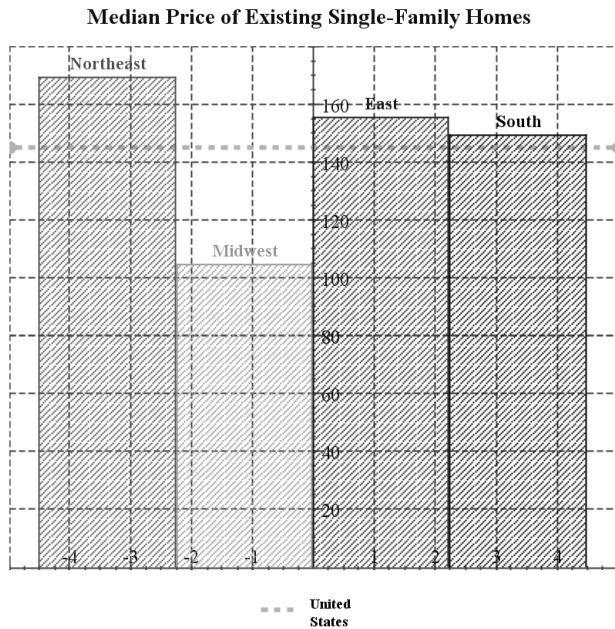
59. Determine the LCD of the rational expressions appearing in the complex fraction below:

$$\frac{\frac{x}{x+8} + \frac{7}{x+9}}{\frac{x-4}{x^2 + 17x + 72}}$$

- a. $(x-4)(x-7)$
- b. $(x-7)(x+4)$
- c. $x+4$
- d. $(x+8)(x+9)$

60. Referring to the graph below, for which regions of the country was the following inequality true?

Median sales price < U.S. median price



- a. Northeast
- b. Midwest
- c. East
- d. South

ANSWER KEY

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1. d
2. d
3. c
4. a
5. c
6. c
7. b
8. c
9. a
10. b
11. f
12. b
13. b
14. d
15. c
16. b
17. d
18. d
19. a
20. b
21. b
22. e
23. b
24. c
25. a
26. b
27. d
28. c
29. c
30. d
31. c
32. d
33. e
34. b
35. b
36. d
37. c
38. b
39. c
40. d
41. a
42. c
43. a,c
44. c
45. a
46. a
47. b
48. d
49. a
50. c
51. a
52. a
53. b
54. b
55. a
56. d
57. c
58. e
59. d
60. b