

MAT 1033

Final Review

A. Acosta

1. Factor the polynomial:

$$125 a^3 - 343 b^6$$

- a. $(5a + 7b^2)(25a^2 - 35ab^2 - 49b^4)$
- b. $(5a - 7b^2)(25a^2 + 35ab^2 - 49b^4)$
- c. $(5a - 7b^2)(25a^2 + 35ab^2 + 49b^4)$
- d. $(5a + 7b^2)(25a^2 + 35ab^2 - 49b^4)$

2. The recommended child's dose of the sedative hydroxine is 0.005 gram per kilogram of body mass. Find the dosage for a 28-kg child.

Choose the answer from the following:

- a. 0.005 mg
- b. 28 mg
- c. 140 mg
- d. 0.28 mg
- e. 0.14 mg

3. Solve the equation.

$$x^3 + 7x^2 + 10x = 0$$

- a. 1, 5, 3
- b. 3, -6, -4
- c. 4, 7, 0
- d. -2, -5, 0

4. Rationalize the numerator in $\frac{\sqrt{3} - 1}{3}$. Choose the correct answer from the following:

- a. $\frac{3}{3\sqrt{3} + 1}$
- b. $\frac{2}{\sqrt{3} - 1}$
- c. $\frac{2}{3(\sqrt{3} + 1)}$

5. Solve the equation:

$$\frac{x}{x + 5} = 1 - \frac{11x + 12}{x^2 + 10x + 25}$$

- a. $x = \frac{13}{6}$
- b. $x = \frac{37}{6}$
- c. $x = \frac{37}{16}$
- d. $x = \frac{13}{16}$

6. The denominators of two fractions are $20a^2b$ and $15ab^2$. Find the LCD. Choose the answer from the following:

- a. $300a^3b^3$
- b. $60a^2b^2$
- c. $5ab$
- d. $12a^2b^2$

MAT 1033

Final Review

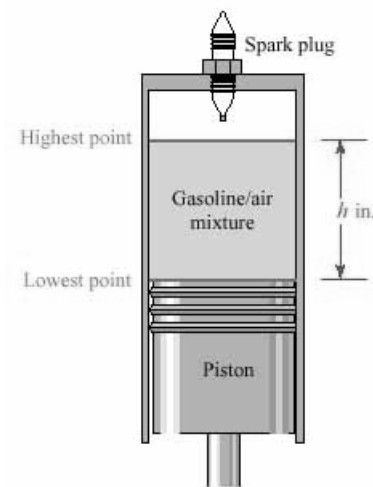
A. Acosta

7. Factor the polynomial.

$$z^2 + 18z + 81 - c^8$$

- a. $(9 + z - c^4)(z - 9 + c^4)$
- b. $(9 + z - c^8)(z + 9 + 1)$
- c. $(9 + z - c^4)(z + 9 + c^4)$

8. 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 44.95 cubic inches of gasoline/air mixture as it moves from its lowest to its highest point. Let $h = 4.97$ inches. Choose the answer from the following:



- a. $r = 46.65$ inches
- b. $r = 1.40$ inches
- c. $r = 1.80$ inches
- d. $r = 1.70$ inches

9. Simplify and combine like radicals $\sqrt[3]{-320} + \sqrt[3]{40}$.

- a. $-6\sqrt[3]{5}$
- b. $6\sqrt[3]{-5}$
- c. $2\sqrt[3]{5}$
- d. $-2\sqrt[3]{5}$

10. Do the operations and simplify: $(4x + 24) \cdot \frac{x^2}{2x - 6} \div \frac{2}{x - 3}$.

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

11. Solve the formula for x :

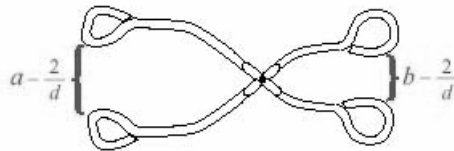
$$G = \frac{c - nx}{1 - x}$$

- a. $x = \frac{c - G}{G + n}$
- b. $x = -\frac{G - c}{G - n}$
- c. $x = \frac{G - c}{G - n}$
- d. $x = \frac{c + G}{G - n}$

12. 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 8 trucks are used 5 hours each, the costs are \$4800. Find the costs of using 14 trucks, each for 12 hours.

- a. \$20160
- b. \$161280
- c. \$67200
- d. \$57600

13. 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 $a = 18$, $b = 12$.



- a. $\frac{9d - 6}{6d - 1}$
- b. $\frac{d - 1}{6d + 1}$
- c. $\frac{9d - 1}{6d - 1}$
- d. $\frac{6d + 1}{9d + 1}$

14. Numbers such as 1, 25, 81, 100, and 225 are called perfect _____. Choose the correct answer from the following.

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

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

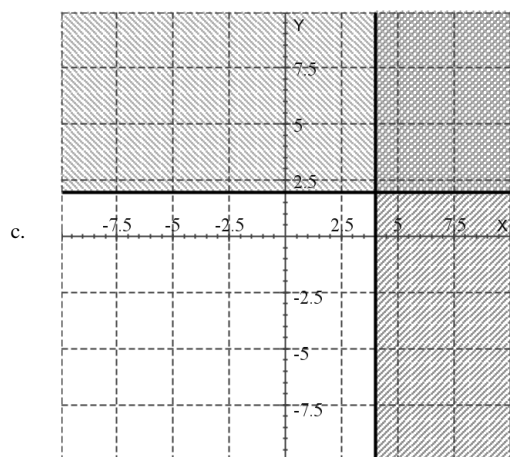
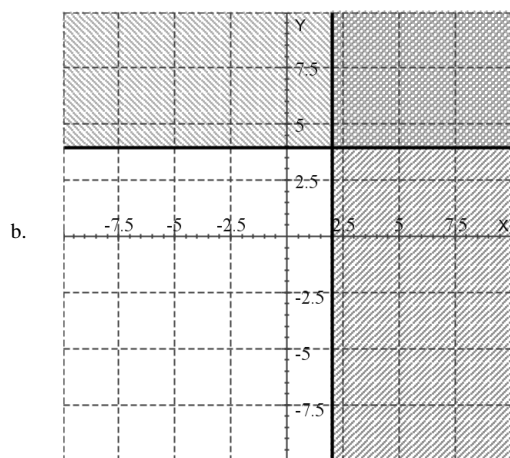
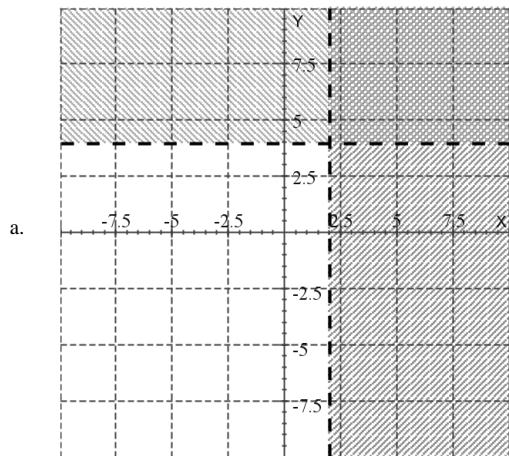
$$\frac{\frac{x}{x+7} + \frac{3}{x+9}}{\frac{x-4}{x^2 + 16x + 63}}$$

- a. $(x - 4)(x - 3)$
- b. $(x - 3)(x + 4)$
- c. $x + 4$
- d. $(x + 7)(x + 9)$

16. Graph the solution set of:

$$\begin{cases} x > 2 \\ y > 4 \end{cases}$$

Select the correct answer:



MAT 1033

Final Review

A. Acosta

17. Factor the polynomial.

$$625z^4 - 16b^4$$

- a. $(25z^2 + 4b^2)(5z + 2b)(5z - 2b)$
- b. $(25z^2 + 4b^2)^2$
- c. $(25z - 4b)^2(5z + 2b)(5z - 2b)$

18. Simplify the expression: $(x + 10) \cdot \frac{1}{x^2 + 18x + 80}$.

- a. $x + 9$
- b. $\frac{1}{x + 9}$
- c. $\frac{1}{x - 8}$
- d. $x + 8$
- e. $\frac{1}{x + 8}$

19. 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 40 cows for 12 days, how long will the feed last for 10 cows?

- a. 96
- b. 24
- c. 48
- d. 240

20. The prime factorizations of three monomials are shown:

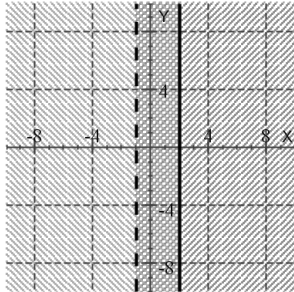
$$\begin{aligned} &2 \cdot 2 \cdot 3 \cdot z \cdot z \cdot b \cdot b \cdot b, \\ &2 \cdot 3 \cdot 3 \cdot z \cdot b \cdot b \cdot b \cdot b, \\ &2 \cdot 3 \cdot 3 \cdot 5 \cdot z \cdot z \cdot z \cdot b \cdot b \end{aligned}$$

Find their GCF. Choose the answer from the following:

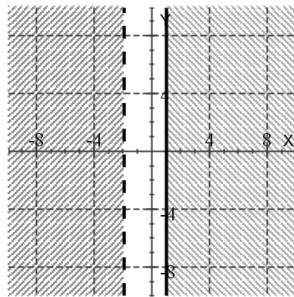
- a. $6z^2b$
- b. $6zb^3$
- c. $180z^3b^3$
- d. $6zb^2$

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

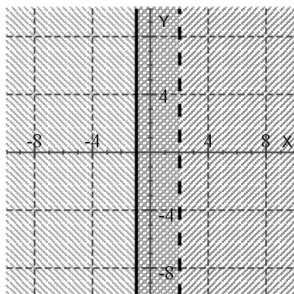
$$-1 \leq x < 2$$



a.



b.



c.

22. The muzzle velocity of a cannon is 272 feet per second. If a cannonball is fired vertically, at what times will it be at the height of 1120 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. 9 sec., 12 sec.
- b. 10 sec., 13 sec.
- c. 8 sec., 11 sec.
- d. 7 sec., 10 sec.

23. Evaluate the polynomial function:

$$f(x) = 4x^2 - 5x + 1 \text{ for } x = 2$$

Choose the answer from the following.

- a. 28
- b. 27
- c. 25
- d. 7

MAT 1033

Final Review

A. Acosta

24. Solve the equation $x - 5 = \sqrt{2x + 14}$. Give the apparent solutions. Cross out the wrong one. Choose the answer from the following:

- a. -10
- b. 6
- c. 31
- d. no solutions
- e. 11
- f. 10

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

- a. $x + 5$
- b. $\sqrt{x + 5}$
- c. $\frac{1}{x + 5}$
- d. $\frac{1}{\sqrt{x + 5}}$

26. Solve the inequality: $-5t + 39.5 \leq 27$.

Select the correct answer:

- a. $[-2.5, 2.5]$
- b. $(-\infty, 2.5]$
- c. $[2.5, \infty)$

27. Do the addition.

$$\begin{array}{r} 9a^3 + 9a^2 + 5 \\ + -8a^3 + 5a - 2 \\ \hline 4a^3 - 4a^2 + 5a + 6 \end{array}$$

Choose the answer from the following.

- a. $5a^3 + 10a^2 + 5a + 9$
- b. $5a^3 + 5a^2 + 10a + 9$
- c. $21a^3 + 13a^2 + 10a + 13$
- d. $5a^3 - 5a^2 - 10a + 9$

28. Find the prime-factored form of the number:

385

Choose the answer from the following.

- a. $7 \cdot 5 \cdot 11$
- b. $77 \cdot 5$
- c. $7 \cdot 55$
- d. $7 \cdot 7 \cdot 11$

29. Simplify the expression $\frac{\sqrt{4dm^2p}}{\sqrt{8dmp}}$ by rationalizing the denominator. All variables represent positive real numbers. Choose the correct answer from the following:

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

Final Review

A. Acosta

30. Simplify the complex fraction

$$\frac{\frac{7}{8}}{\frac{7}{2}}$$

- a. $\frac{2}{5}$
- b. $\frac{3}{6}$
- c. $\frac{1}{4}$
- d. $\frac{1}{2}$

31. Use the quadratic formula to solve the equation: $5x + 6 = 14x^2$.
Choose the correct answer from the following:

- a. $\frac{6}{7}, \frac{1}{2}$
- b. $\frac{1}{7}, \frac{1}{2}$
- c. $\frac{1}{7}, -\frac{1}{2}$
- d. $\frac{6}{7}, -\frac{1}{2}$

32. Use the square root property to solve the equation $2x^2 - 98 = 0$. Choose the answer from the following:

- a. $x = 7, x = -7$
- b. $x = 2, x = -2$
- c. $x = 98, x = -98$
- d. $x = 7, x = 0$

33. Solve the equation:

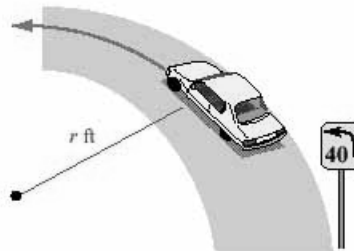
$$\frac{1}{y+3} + \frac{2}{3} = 7$$

- a. $\frac{-54}{19}$
- b. $\frac{60}{19}$
- c. $\frac{-54}{23}$
- d. no solution

34. Use factoring to solve the equation $3z^2 = 30z - 27$. Choose the answer from the following:

- a. $z = -1, z = -9$
- b. $z = 1, z = 9$
- c. $z = 30, z = 0$
- d. $z = 3, z = -3$

35. 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 30-mph traffic, what radius should they specify? Round the result to the nearest foot.



Choose the answer from the following:

- a. 8 feet
 - b. 1000 feet
 - c. 27000 feet
 - d. 15 feet
 - e. 3 feet
 - f. 100 feet
36. Rationalize the denominator and simplify the radical expression: $\frac{\sqrt[3]{9z}}{\sqrt[3]{3zc}}$ All variables represent positive real numbers. Choose the correct answer from the following:

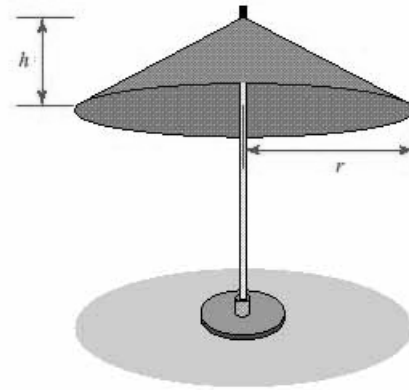
- a. $\frac{\sqrt[3]{3c}}{c^2}$
- b. $\frac{\sqrt[3]{3c^2}}{c}$
- c. $\frac{\sqrt[3]{3c^3}}{c}$

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

$9x^2y - 7x + 18y$ is a _____

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

38. 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 $h = 9$.



- a. $11\pi\sqrt{202}$
b. $11\pi^3\sqrt{202}$
c. $22\pi\sqrt{202}$
39. The denominators of two fractions are $x^3 + 8$ and $x^2 + 4x + 4$. Find the LCD.

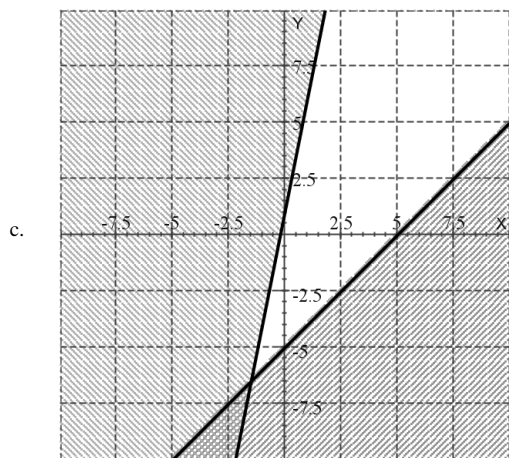
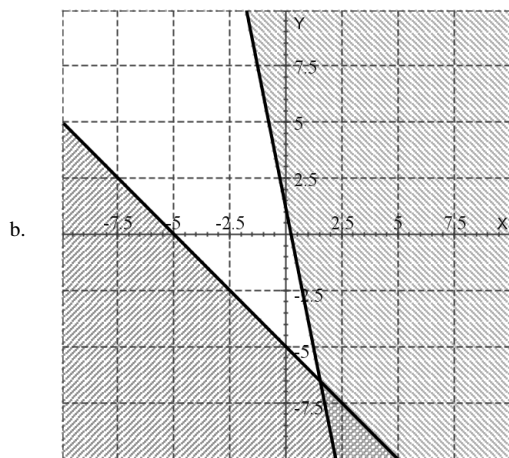
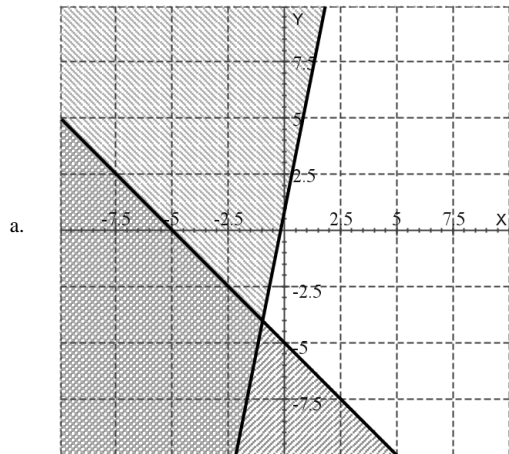
Choose the answer from the following:

- a. $(x-2)^3$
b. $(x+2)^3$
c. $(x^3+8)(x+2)$
d. x^3-8

40. Find the solution set of:

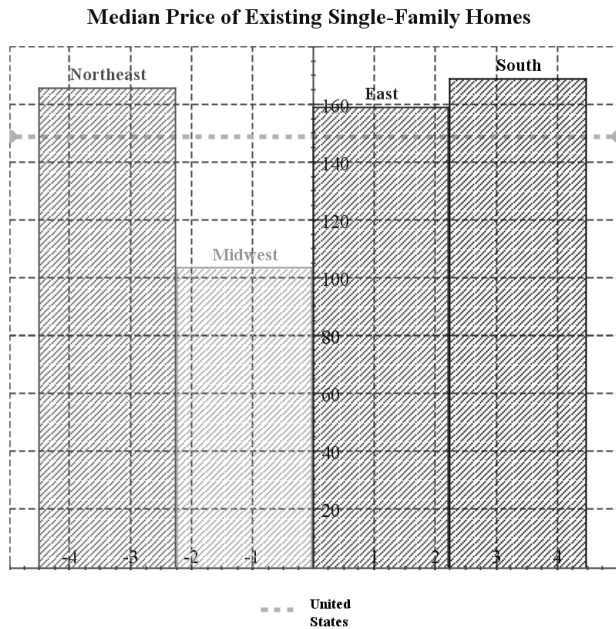
$$\begin{cases} y \leq x - 5 \\ y \geq 5x + 1 \end{cases}$$

Select the correct answer:



41. 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

42. Factor by grouping $x^2 - 12x + 4xy - 48y$.

Choose the answer from the following:

- a. $(x - 4y)(x - 13)$
- b. $(x + 4y)(x - 12)$
- c. $(x - 5y)(x + 12)$
- d. $(x + 6y)(x + 14)$

MAT 1033

Final Review

A. Acosta

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

a. $\frac{z - 2\sqrt{zd} + d}{z + 2\sqrt{zd} + d}$

b. $\frac{z - d}{z - 2\sqrt{zd} + d}$

c. $\frac{z - 2\sqrt{zd} + d}{z - d}$

d. $\frac{z + d}{z - 2\sqrt{zd} + d}$

e. $\frac{z - d}{z + 2\sqrt{zd} + d}$

f. $\frac{z - 2\sqrt{zd} + d}{z + d}$

44. Simplify the expression $(-5\sqrt[3]{3x+2})^3$. Choose the answer from the following:

- a. $15x + 250$
- b. $-375x - 250$
- c. $3375x + 1000$
- d. $-3375x - 1000$
- e. $-15x - 250$
- f. $375x + 250$

45. Use the quadratic formula and a scientific calculator to solve the equation $-4.9x^2 + 2.7x + 3.1 = 0$. Give the answers to the nearest hundredth. Choose the correct answer from the following:

- a. $-0.57, -1.12$
- b. $0.57, 1.12$
- c. $1.12, -1.12$
- d. $-0.57, 1.12$
- e. $-0.57, 0.57$

46. Solve the expression and choose the correct answer.

$$\frac{20}{i^3}$$

- a. $-20i$
- b. $20i$
- c. 20
- d. $\frac{20}{i}$
- e. -20
- f. $\frac{20}{-i}$

MAT 1033**Final Review****A. Acosta**

47. Factor the expression $8(m + n + p) + x(m + n + p)$.

Choose the answer from the following:

- a. $(8 + x)(m + n + p)$
- b. $(9 + n)(m - x + p)$
- c. $(8 + p)(m - n - x)$
- d. $(7 + m)(x + n - p)$

48. Simplify the expression: $(81x^4)^{1/4}$. Assume that all variables are unrestricted. Use absolute value symbols if necessary. Choose the correct answer from the following.

- a. $3x$
- b. $-3x$
- c. $3|x|$

49. Solve the equation by completing the square: $3x^2 - 21x - 132 = 0$. Choose the answer from the following:

- a. $x = 11, x = -4$
- b. $x = 11, x = 0$
- c. $x = -21, x = -3$
- d. $x = -11, x = 4$

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

$$\frac{8 - k - \frac{10}{k}}{\frac{8}{k^2} + \frac{14}{k} - 14}$$

- a. Numerator: $8k^2 - k^3 - 10k$; Denominator: $8 + 14k - 14k^2$
- b. Numerator: $12k^2 - k^3 + 10k$; Denominator: $8 - 17k + 14k^2$
- c. Numerator: $10k^2 - k^3 + 10k$; Denominator: $8 + 14k - 16k^3$
- d. Numerator: $9k^3 - k^2 - 10k$; Denominator: $8 + 15k - 14k^2$

51. Simplify the expression: $\frac{x^2 - 49}{x^2 - 25} \div \frac{x + 7}{x - 5}$.

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

52. Do the operation: $-\frac{9}{13} \div \frac{90}{117}$.

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

MAT 1033

Final Review

A. Acosta

53. Complete the square to solve the equation $6r^2 - 48r + 72 = 0$. Choose the answer from the following:

- a. $r = -12, r = 0$
- b. $r = 8, r = 72$
- c. $r = 2, r = 6$
- d. $r = -2, r = -6$

54. If a polynomial is divided by $7a - 7$ and the quotient is $3a + 6$ with a remainder of 2, how should the result look? Choose the answer from the following:

- a. $7a - 7 + \frac{2}{3a + 6}$
- b. $3a + 6 + \frac{7a - 7}{2}$
- c. $3a + 6 + 2$
- d. $3a + 6 + \frac{2}{7a - 7}$

55. Use the square root property to solve the equation $x^2 = 25$. Choose the answer from the following:

- a. $x = 5, x = -5$
- b. $x = 4, x = -6$
- c. $x = 25, x = -25$
- d. $x = 7, x = 0$

56. Do the division $\frac{70x^4 y^{10}}{10x^6 y^6}$.

Choose the answer from the following:

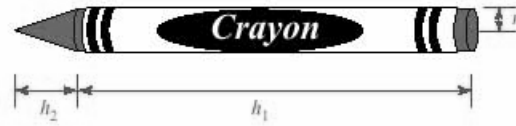
- a. $\frac{7y^4}{x^2}$
- b. $\frac{7x^2}{4}$
- c. $7y^4 x^{-2}$
- d. $7y^4 x^2$

57. Solve the inequality: $14x > -140$.

Select the correct answer:

- a. $(-\infty, -10)$
- b. $(-10, 10)$
- c. $(-10, \infty)$

58. 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 $r = 3$.



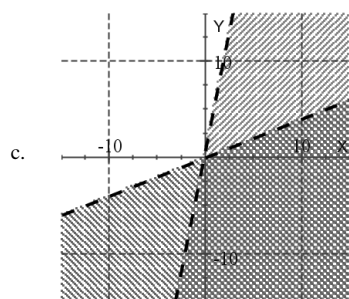
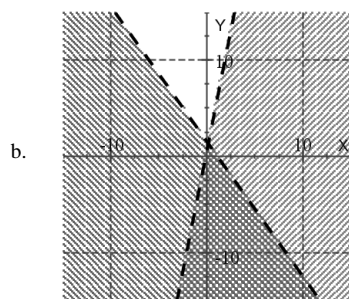
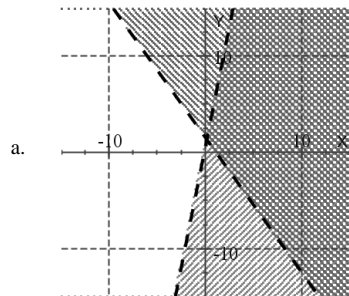
Choose the answer from the following.

- a. $V = 9(h_2 + \frac{1}{3}h_1)$
- b. $V = 16\pi(h_1 + \frac{1}{3}h_2)$
- c. $V = 9\pi(h_1 + \frac{1}{3}h_2)$
- d. $V = 16\pi(h_1 - \frac{1}{3}h_2)$

59. Graph the solution set of:

$$\begin{cases} -10x + 2y < 2 \\ 7x + 5y < 8 \end{cases}$$

Select the correct answer:



60. Solve the equation:

$$\frac{x+5}{x+7} - \frac{x-3}{x-4} = 0$$

- a. $x = \frac{41}{-3}$
- b. $x = \frac{-1}{5}$
- c. no solution
- d. $x = \frac{-1}{-3}$
- e. $x = \frac{41}{19}$
- f. $x = \frac{-1}{19}$

ANSWER KEY

MAT 1033

Final Review

A. Acosta

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