MERCER COUNTY COMMUNITY COLLEGE

MAT135

Review for Challenge Test

Mathematics Department
Fall 2013

The problems presented within these pages are meant to be representative of the material tested throughout the semester in MAT135. Solutions to these problems and other references are included at the end of this document.

1. Find the slope of the line passing through the points $(-1,-7)$ and $(5,4)$.

A. $-\frac{2}{11}$ B. $\frac{11}{6}$ C. $-\frac{3}{4}$ D. $\frac{6}{11}$

2. Factor completely: $8x^3y-32xy^3$.

A. $2xy(2x+4y)(2x-4y)$
B. $8xy(x+2y)(x-2y)$
C. $2x^2(4x^5y-16x^3y^3)$
D. $xy(4x+4y)(2x-4y)$

3. Identify the *x*- and *y*-intercepts of the graph of the equation $3x-3y=7$.

A. *x*-intercept: $\left(-\frac{3}{7},0\right)$ *y*-intercept: $\left(0,\frac{3}{7}\right)$
B. *x*-intercept: $\left(-\frac{7}{3},0\right)$ *y*-intercept: $\left(0,\frac{7}{3}\right)$
C. *x*-intercept: $\left(\frac{7}{3},0\right)$ *y*-intercept: $\left(0,-\frac{7}{3}\right)$
D. *x*-intercept: $\left(\frac{3}{7},0\right)$ *y*-intercept: $\left(0,-\frac{3}{7}\right)$

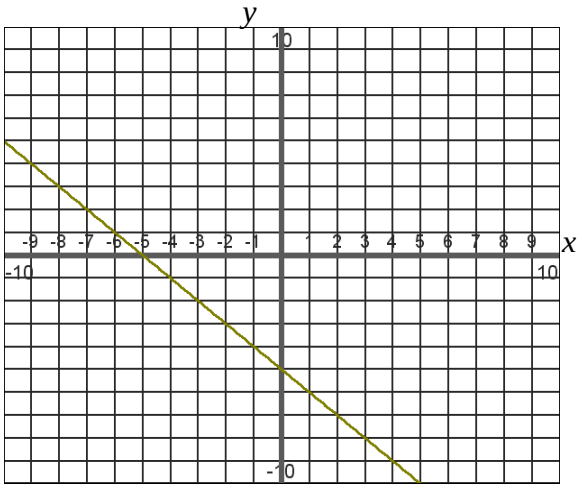
4. Solve: $5x-2=3x-8$.

A. The equation has no solution.
B. $x=-3$
C. $x=\frac{5}{4}$
D. $x=-8$

5. Find a set of ordered pairs $(x,\ y)$ that represents *y* as a function of *x*.

A. $\{(5,-3),(-3,5),(1,1)\}$
B. $\{5,-3,-9,1\}$
C. $\{(5,-3),(-3,-9),(5,1)\}$
D. $\{(5,-3),(-9,1),(-9,5),(1,-9)\}$

6. Estimate the slope of the line. You may assume that each tick mark represents one unit.



A. 1 B. -1 C. $-\frac{2}{7}$ D. $-\frac{7}{2}$

7. What is the vertex of $f(x)=x^2+2x$?

A. $(1,1)$ B. $(1,-1)$ C. $(-1,1)$ D. $(-1,-1)$

8. Solve: $4r^2-20r=-25$.

A. $r=-25, r=-5/4$

B. $r=-25, r=-45/4$

C. $r=-5/2$

D. $r=5/2$

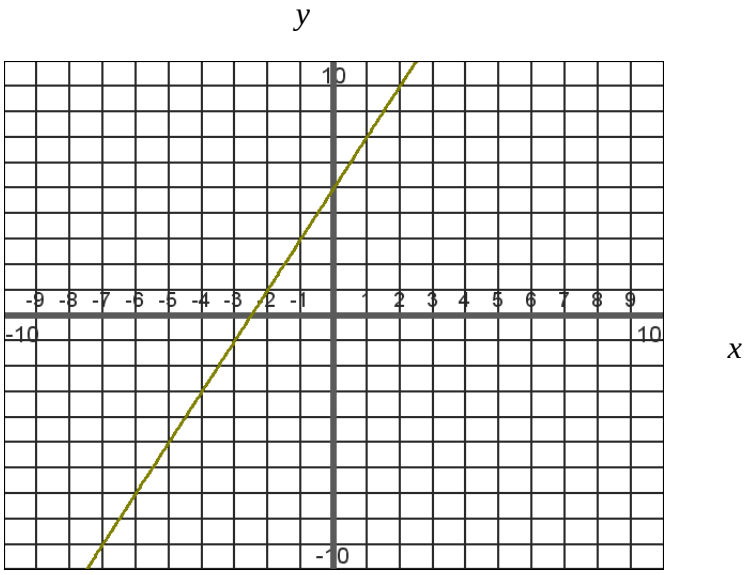
9. Simplify: $\sqrt[3]{81a^5b^9}$.

A. $3ab^3\sqrt{3a^2}$ B. $3a^3b^9\sqrt[3]{3a^2}$ C. $3ab^3\sqrt[3]{3ab}$ D. $3ab^3\sqrt[3]{3a^2}$

10. Simplify: $\left(\frac{2x^{-2}}{5x^2}\right)^{-3}$.

A. $\frac{125x^{12}}{8}$ B. $\frac{8x^{12}}{125}$ C. $125x^{12}$ D. $8x$

11. What is true of the graph below? You may assume that each tick mark represents one unit.



A. The y-intercept is at $(-2, 0)$.
B. The graph has a negative slope.
C. $f(0) = 5$.
D. The graph passes through the point $(-1, -3)$.

12. Find the solution to the equation $\frac{x+6}{3} + \frac{x-6}{5} = 4$.

A. $x = 24$ B. $x = 6$ C. $x = -22$ D. $x = -4$

13. Solve: $2x^2 - 4x + 1 = 0.$

A. $x = \frac{2 \pm \sqrt{2}}{2}$ B. $x = \frac{-2 \pm \sqrt{2}}{2}$ C. $x = -1 \pm \sqrt{2}$ D. $x = 1 \pm \sqrt{2}$

14. Which of the following is the graph of $f(x) = x^2$ shifted two units to the left and three units down?

A. $f(x) = (x-2)^2 - 3$
B. $f(x) = (x-3)^2 - 2$
C. $f(x) = (x+2)^2 - 3$
D. $f(x) = (x+3)^2 - 2$

15. Find the slope-intercept form of the equation of the line through the point $(2,7)$ parallel to the line $9x-4y=1$.

A. $y=\frac{9}{4}x-\frac{2}{5}$ C. $y=\frac{9}{4}x+\frac{5}{2}$

B. $y=\frac{4}{9}x-\frac{2}{5}$ D. $y=-\frac{9}{4}x+\frac{5}{2}$

16. Perform the indicated operation: $(-3+2i)(-3-7i)$.

A. $-5+27i$ B. $23+15i$ C. $-5+15i$ D. $23-15i$

17. Write an equation of the line passing through the point $(6,-10)$ with an undefined slope.

A. $x=6$ B. $x=-10$ C. $y=6$ D. $y=-10$

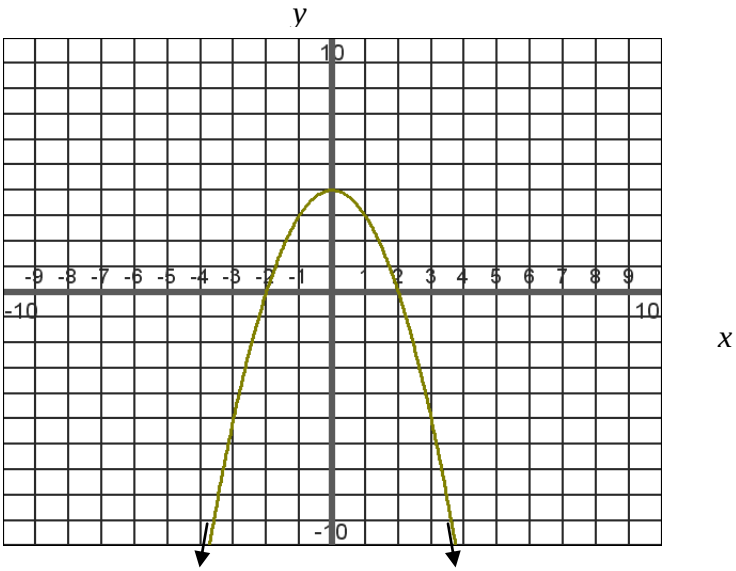
18. If $f(x)=2x^2+3x$ and $g(x)=1+5x$, for what values are $f(x)=g(x)$?

A. $x=1\pm\sqrt{3}$ B. $x=-1\pm\sqrt{3}$ C. $x=\frac{1\pm\sqrt{3}}{2}$ D. $x=-\frac{1\pm\sqrt{3}}{2}$

19. A rectangular garden enclosed by 450 yards of fencing has a length of *x* yards. Which of the following expresses the area, A, of the garden as a function of its length *x*?

A. $A=x(450-x)$ B. $A=x(225-x)$ C. $A=2x(225-x)$ D. $A=\frac{450-2x}{x}$

20. What is the range of the function shown below? You may assume that each tick mark represents one unit.



A. $(-\infty,\infty)$ B. $[4,\infty)$ C. $(-\infty,4]$ D. $[-2,2]$

21. Factor completely $14a^5 - 28a^4b - 35a^3b^2$.

A. $a^3(14a^2 - 28ab - 35b^2)$

B. $7a\ (2a^4 - 4a^3b - 5a^2b^2)$

C. $7a\ (2a^5 - 4a^2b - 5a^4b^2)$

D. $7a^3(2a^2 - 4ab - 5b^2)$

22. If $f(x) = \dfrac{6x}{x+2} + x$, for what values of x is $f(x)$ =8?

A. $x = 0$ B. $x = -4,\ x = 4$ C. $x = 16$ D. $x = -8,\ x = 2$

23. A salesperson earns \$30,000 a year plus 8% commission on his total sales. Write an equation that expresses this relationship between his earnings *(E)* and total sales *(S).*

A. $E = 30,000 + 8S$

B. $E = 30,000 - 8S$

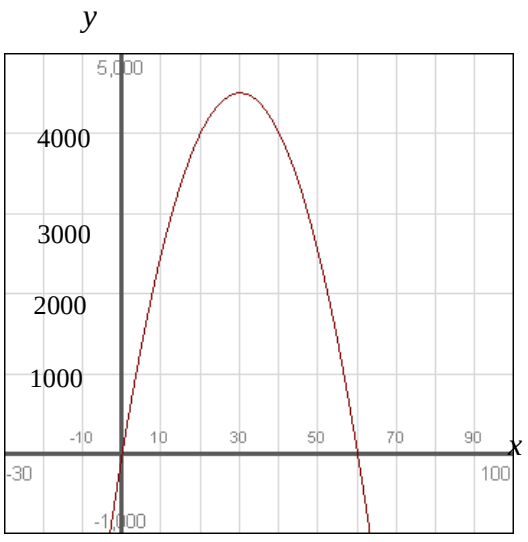
C. $E = 8S - 30,000$

D. $E = 30,000 + 0.08S$

24. Solve: $|6x - 3| > 9$.

A. $(-1, 2)$ B. $[-1, 2]$ C. $(-\infty, -1) \cup (2, \infty)$ D. $(-\infty, -1] \cup [2, \infty)$

25. The graph below represents a company's profit from selling tickets for a weekend trip. The *x*-axis represents the number of tickets sold and the *y*-axis represents the profit made. What is the least number of tickets that must be sold to make a profit of \$4,000.00? Please note the scale on the axes.



A. 10 B. 20 C. 30 D. 40

26. Solve $A = mx + bx$ for x.

A. $x = \dfrac{A}{mb}$

B. $x = A - m - b$

C. $x = \dfrac{A}{m + b}$

D. $x = \dfrac{A}{m - b}$

27. If $f(x) = 4x^3 - 6x^2 - x + 28$, evaluate $f(-2)$.

A. -38 B. -36 C. -26 D. -8

28. What is the domain of $r(x) = \dfrac{6x}{x(x^2 - 1)}$?

A. All real numbers $x \neq 0, x \neq \pm 1$.

B. All real numbers $x \neq \pm 1$.

C. All real numbers $x \neq 0$.

D. All real numbers.

29. What number must be added to $t^2 - \dfrac{4}{3}t$ to complete the square?

A. $\dfrac{16}{9}$ B. $\dfrac{4}{9}$ C. $\dfrac{2}{3}$ D. $\dfrac{8}{3}$

30. Simplify: $-16^{3/2}$.

A. $-64i$ B. $-4\sqrt[3]{4}$ C. $64i$ D. -64

31. If $f(x) = \dfrac{7}{x^2 - 11x + 18}, g(x) = \dfrac{4}{x^2 - 3x - 54}$, find $f(x) + g(x)$.

A. $\dfrac{11x^2 - 65x - 306}{(x-2)(x-9)(x+6)}$

B. $\dfrac{11x^2 - 36}{(x-2)(x+9)(x-6)}$

C. $\dfrac{11x + 34}{(x-2)(x-9)(x+6)}$

D. $\dfrac{11x^2 - 65x - 18}{(x-2)(x+9)(x-6)}$

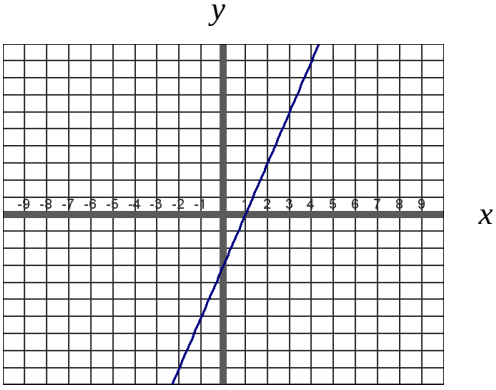
32. What is the equation of the line graphed in the coordinate plane below? You may assume that each tick mark represents one unit.

(A) $y = -3x + 3$

(B) $y = 3x - 3$

(C) $y = -3x - 3$

(D) $y = 3x + 3$



33. Factor $4x^3 + 33x^2 + 68x + 15$ given that $x + 3$ is a factor.

A. $(x+3)(x+5)(4x+1)$
B. $(x+3)(x-5)(4x-1)$
C. $(x+3)(x+5)(4x-1)$
D. $(x-3)(x-5)(4x+1)$

34. If $f(x) = \dfrac{x+9}{x-1}$, find all values for which $f(x) = \dfrac{3}{2}$.

A. $x = \dfrac{21}{5}$ B. $x = 21$ C. $x = 15$ D. $x = -2$

35. Solve the following system: $\begin{cases} 5x + 2y = 11 \\ 4x + 7y = -2 \end{cases}$.

A. This system of equations has no solution.
B. $x = \dfrac{31}{15}, y = \dfrac{1}{3}$
C. This system of equations has an infinite number of solutions.
D. $x = 3, y = -2$

36. Simplify: $(-10 + 2\sqrt{-16}) - (-2 - 2\sqrt{-4})$.

A. $12i$ B. $-8 + 4i$ C. $-8 + 12i$ D. $-12 + 12i$

37. Solve: $\left|\dfrac{6}{7}x + 6\right| + 3 = 14$.

A. $\left\{\dfrac{161}{6}, \dfrac{119}{6}\right\}$ B. $\left\{-\dfrac{102}{7}, \dfrac{119}{6}\right\}$ C. $\left\{-\dfrac{161}{6}, \dfrac{30}{7}\right\}$ D. $\left\{-\dfrac{119}{6}, \dfrac{35}{6}\right\}$

38. A line passes through the point $(7,-7)$ and has a slope that is undefined. Which of the points below is also on the line?

A. $(1,-7)$ B. $(1,7)$ C. $(7,1)$ D. $(-7,-1)$

39. What is true of $f(x)=x^2+2x+4$?

A. The y-intercept is $(0,-4)$.

B. It is a parabola that opens downward.

C. $f(x)$ has no real roots

D. The vertex is at (2,4)

40. Which point is on the line that passes through the point $(-5,3)$ and has slope $m=-4$?

A. $(1,-21)$ B. $(-4,1)$ C. $(0,7)$ D. $(-1,19)$

41. $(x-3)^2=$

A. x^2-9

B. x^2+9

C. x^2-6x+9

D. x^2-6x-9

42. Simplify: $\frac{1}{4}\sqrt{800}-\sqrt{200}+\frac{1}{2}\sqrt{6^2}$.

A. $-2\sqrt{2}$ B. $-5\sqrt{2}+3$ C. $15\sqrt{2}+3$ D. $5\sqrt{2}+3$

43. What is the domain of $f(x)=\sqrt{-x-4}$?

A. $(-\infty,-4]$ B. $(-\infty,0]$ C. $[-4,\infty)$ D. $[0,\infty)$

44. If $f(x)=\frac{x}{x^2-16}$ and $g(x)=\frac{7}{x^2+5x+4}$, find $f(x)-g(x)$.

A. $\frac{x^2-6x+28}{(x-4)(x+4)}$

B. $\frac{x^2-6}{(x-4)(x+4)}$

C. $\frac{x^2-6x+28}{(x-4)(x+4)(x+1)}$

D. $\frac{x^2+6x+28}{(x-4)(x+4)(x+1)}$

45. Find the vertex of the graph of the function $f(x) = 3x^2 + 24x + 46$.

A. $(4, 2)$ B. $(-4, -2)$ C. $(-2, -4)$ D. $(2, 4)$

46. Solve: $\sqrt{x+9} - 3 = x$.

A. $x = 0, x = -5$ B. $x = -5$ C. $x = 0$ D. $\varnothing$

47. What is the least common denominator for $\frac{3x}{x^2 - 16}$ and $\frac{4}{2x - 8}$?

A. $2(x+4)(x-4)$
B. $4(x^2 - 16) + 3x(2x - 8)$
C. $2(x-4)$
D. $(x^2 - 16)(2x - 8)$

48. Which of the following is true?

A. $(a+b)^2 = a^2 + b^2$
B. $(a-b)^2 = a^2 + b^2$
C. $x^2 - 8x + 16 = (x+4)(x-4)$
D. $x^2 - 8x + 16 = (x-4)^2$

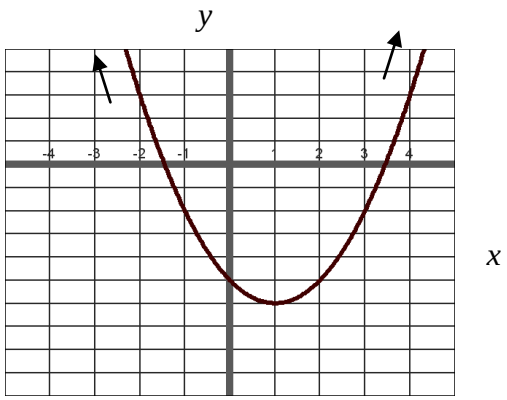
49. The discriminant of a quadratic equation with real coefficients is -9. Which of the following statements is true?

A. There is only one solution and this may be real or complex.
B. There are two complex solutions.
C. There are two real solutions.
D. There may be 0, 1, or 2 real solutions.

50. Solve: $\begin{cases} x - 2y = 7 \\ 2x + 5y = 5 \end{cases}$.

A. $x = -5, y = -1$ B. $x = 4, y = 0$ C. $x = 4, y = 4$ D. $x = 5, y = -1$

51. What is the domain and range of the graph shown below? You may assume that each tick mark represents one unit.



A. Domain $(-\infty,\infty)$, Range $[2,\infty)$
B. Domain $(-\infty,\infty)$, Range $[-6,\infty)$
C. Domain $(-\infty,\infty)$, Range $(-\infty,\infty)$
D. Domain $(-\infty,\infty)$, Range $[0,\infty)$

52. Which of the following is the graph of $f(x)=|x|$ moved one unit to the right, two units up, and reflected across the *x*-axis?

A. $f(x)=-|x+1|+2$
B. $f(x)=-|x+2|+1$
C. $f(x)=-|x-1|+2$
D. $f(x)=-|x-2|+1$

53. Evaluate: $(2-5i)+(5+2i)$.

A. $-3+7i$ B. $-7+3i$ C. $7-3i$ D. $7+3i$

54. Which of the following is **not** equivalent to $x^{\frac{7}{5}}$?

(A) $\sqrt[7]{x^5}$ (B) $\left(\sqrt[5]{x}\right)^7$ (C) $\sqrt[5]{x^7}$ (D) $\left(x^{\frac{1}{5}}\right)^7$

55. The following table shows the number of packages of paper purchased, *P*, and the cost, *C*, of purchasing that number of packages of paper:

P	***C* ($)**
2	8
6	24
8	32

Which of the following expresses *C* in terms of *P*?

A. $C = 4 + P$ C. $C = 4P$

B. $C = P/4$ D. $C = P - 4$

56. Solve: $x + 1 < 4$ and $3 - x > 5$.

A. $(-\infty, -2)$ B. $(-\infty, 3)$ C. $(-2, 3)$ D. $(-\infty, -2) \cup (3, \infty)$

57. Simplify: $\sqrt{225a^{12}b^6}$.

A. $15a^6b^3$ B. $15a^{12}b^6$ C. $25a^6b^3$ D. $115a^9b^9$

58. Divide: $\dfrac{9-2i}{3-6i}$.

A. $3 + \dfrac{1}{3}i$ B. $-2\dfrac{1}{3}i$ C. $\dfrac{13}{15} - \dfrac{16}{15}i$ D. $\dfrac{13}{15} + \dfrac{16}{15}i$

59. Perform the indicated operations and simplify: $\dfrac{x^2 - 4x - 21}{7x} \bullet \dfrac{x^2 - 7x}{x^2 - 14x + 49} \div \dfrac{x+3}{x+7}$.

A. $\dfrac{x+7}{7}$ B. $\dfrac{x-7}{x}$ C. $\dfrac{x+7}{3}$ D. $\dfrac{x+3}{x}$

60. Solve $A = \dfrac{BC}{Bx + Y}$ for B.

A. $B = AY(Ax - C)$.

B. $B = \dfrac{AY}{Ax - C}$

C. $B = \dfrac{Y}{C - Ax}$

D. $B = \dfrac{AY}{C - Ax}$

61. Profit may be determined by calculating the revenue function minus the cost function. If the revenue a store receives is modeled by the function $R(x) = 55x - 2x^2$ and the store's costs are modeled by the function $C(x) = 23x + 98$, find the *x*-value that will make the store's profit a maximum.

A. 9 B. 16 C. 8 D. 13.75

62. For which values is $\frac{x^2 + x - 6}{3x^2 - 20x - 7}$ undefined?

A. $x = -3, x = 7$ C. $x = \frac{1}{3}, x = -7$

B. $x = -3, x = 2$ D. $x = -\frac{1}{3}, x = 7$

63. Factor completely: $7x^8 + 8x^7 - 35x - 40$.

A. $(x^7 - 5)(7x + 8)$ C. $(x^8 - 5)(7x + 8)$

B. $(x^2 + 5)(7x - 8)$ D. $(x^7 - 5)(7x - 8)$

64. An arrow is shot into the air at a speed of 32 feet per second from a platform 12 feet high. The height of the arrow is given by the function $h(t) = -16t^2 + 32t + 12$, where *t* is time in seconds. What is the maximum height of the arrow?

A. 28 feet B. 16 feet C. 12 feet D. 11 feet

65. Factor: $4x^2 - 25y^2$.

A. $(2x + 5y)(2x + 5y)$ C. $(2x + 5y)(2x - 5y)$

B. $(2x - 5y)(2x - 5y)$ D. $(4x + 5y)(x - 5y)$

66. What is true of the line passing through the point $(5, -3)$ and $(2, 6)$?

A. $m = 3$ and the y-intercept is (0,0).

B. $m = -3$ and the y-intercept is $(0,12)$.

C. $m = \frac{1}{3}$ and the y-intercept is $(0,9)$.

D. $m = -\frac{1}{3}$ and the y-intercept is $(0,-9)$.

67. $\frac{8x}{3x+6} \bullet \frac{2x+4}{x^2-4} =$

A. $\frac{4x}{3x^2 - 3}$ B. $\frac{16}{(3x + 6)}$ C. $\frac{4x^2}{3x + 3}$ D. $\frac{16x}{3x^2 - 12}$

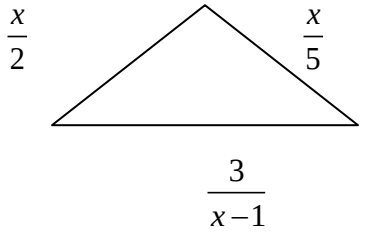
68. 1,000 people were surveyed. Let $f(x)$ equal the number of people who are fans of the Philadelphia Phillies baseball team. Let $g(x)$ equal the number of people who are fans of the New York Yankees Baseball team. Everyone else picked some other team. Which of the statements below represents the number of people who picked another team?

A. $1{,}000 + (f(x) + g(x))$
B. $1{,}000 - (f(x) - g(x))$
C. $1000 - (f(x) + g(x))$
D. $(f(x) - g(x)) - 1000$

69. Solve: $x^{2/3} - 5x^{1/3} + 6 = 0$.

A. $x = 27,\ x = 8$
B. $x = -27, x = 8$
C. $x = 3,\ x = 2$
D. $x = -3,\ x = -2$

70. Express the perimeter of the triangle as a single rational expression.



A. $\dfrac{7x^2 - 7x + 30}{10x - 10}$ B. $\dfrac{3x^2 - 3x + 30}{x - 1}$ C. $\dfrac{3x^2 - 3x + 3}{x}$ D. $\dfrac{7x^2 - 7x + 3}{x - 1}$

Key

1. B
2. B
3. C
4. B
5. A
6. B
7. D
8. D
9. D
10. A
11. C
12. B
13. A
14. C
15. C
16. B
17. A
18. C
19. B
20. C
21. D
22. B
23. D
24. C
25. B
26. C
27. C
28. A
29. B
30. D
31. C
32. B
33. A
34. B
35. D
36. C
37. D
38. C
39. C
40 A
41. C
42. B
43. A
44. C
45. B
46. C
47. A
48. D
49. B
50. D
51. B
52. C
53. C
54. A
55. C
56. A
57. A
58. D
59. A
60. D
61. C
62. D
63. A
64. A
65. C
66. B
67. D
68. C
69. A
70. A

Other references:

Solving for a Variable: Although you can't print most of these out without signing up at the site, there are some useful presentations to help with this topic.

http://www.slideshare.net/crainsberg/solving-literal-equations

http://www.scribd.com/doc/6932127/Algebra-1-Notes-YORKCOUNTY-FINAL-Unit-3-Lesson8-Solving-Literal-Equations

Setting up word equations: http://www.slideshare.net/ejboggs/translating-algebra

Absolute value equations and inequalities:

http://www.purplemath.com/modules/absineq.htm

http://www.analyzemath.com/AbsEqIneq/AbsEqIneq.html

http://www.khanacademy.org/math/algebra/#absolute-value

Systems of equations:

http://people.hofstra.edu/Stefan_Waner/RealWorld/tutorialsf1/frames2_1.html

http://www.khanacademy.org/math/algebra/#systems-of-eq-and-ineq

Graphing: http://www.khanacademy.org/math/algebra/#linear-equations-and-inequalitie

Complex Numbers: http://www.khanacademy.org/math/algebra/#complex-numbers

Self-quiz on solving quadratic equations:
http://teachers.henrico.k12.va.us/math/HCPSAlgebra1/Documents/examviewweb/ev8-6.htm

Finding LCD (whole numbers)http://www.youtube.com/watch?v=YbuFd_jio28

Adding Rational Expressions http://www.youtube.com/watch?v=omv7Di2o8-Y

Adding/Subtracting Rational Expressions http://www.youtube.com/watch?v=FZdt73khrxA

Radicals: http://www.algebra.com/algebra/homework/Radicals/Simplifying-Radicals.lesson

Polynomials and Factoring: http://www.khanacademy.org/math/algebra/#polynomials

Completing the square:
http://www.youtube.com/watch?v=_GBtlR4m67g

http://www.youtube.com/watch?v=GyCuj1hx_zc&feature=fvw

Quadraic Equations: http://www.khanacademy.org/math/algebra/#quadtratics

Some texts for review may be found in the College library:

Akst and Bragg, Introductory Algebra Through Applications, Seventh Edition

Akst and Bragg, Intermediate Algebra Through Applications, Second Edition

McKeague, Charles, Intermediate Algebra, Seventh Edition.

Tussy and Gustafson, Elementary and Intermediate Algebra, Third Edition

Stewart, Redlin, Watson, College Algebra, Fourth Edition

Blitzer, College Algebra: An Early Functions Approach, First Edition

Miller, O'Neill, Hyde, Intermediate Algebra, Second Edition