

My Math Plan Assessment #3 Study Guide

1. Identify the vertex of the parabola with the given equation.

$$f(x) = (x - 5)^2 - 7$$

2. Find the value of the function.

Find $f(-6)$ for $f(x) = -2x + 11$

3. Graph the linear inequality.

$$-3x + 2y < 8$$

4. Graph the linear inequality.

$$6x - 4y \geq 16$$

5. Multiply the complex numbers.

$$(3 + 4i)(-9 - 7i)$$

6. Graph the polynomial function.

$$f(x) = (x - 3)(x + 6)(4 - x)$$

7. Find the **x-intercept** and the **y-intercept** of the linear equation.

$$5x - 6y = 12$$

8. Solve the absolute value inequality. Express the solution in interval notation.

$$|3x + 4| > 7$$

9. Solve the absolute value inequality. Express the answer in interval notation.

$$|2x - 3| \leq 11$$

10. Solve the radical equation

$$\sqrt{16x^2 + 9x + 1} = 4x + 2$$

11. Solve the radical equation.

$$\sqrt{11x - 2} = x + 2$$

12. Solve the radical equation.

$$\sqrt{-2 + 3x} - 4 = 5$$

13. Identify the equations of the vertical asymptotes, if any.

$$g(x) = \frac{6x + 1}{x - 5}$$

14. Solve the quadratic equation using the Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$5x^2 + 9x = -2$$

15. Solve the quadratic equation using the Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$3x^2 + 8x = -7$$

16. Solve the quadratic equation.

$$(x - 5)^2 = -18$$

17. Solve the quadratic equation.

$$(x + 9)^2 = 4$$

18. Solve the quadratic equation.

$$x^2 - 12 = 0$$

19. In a certain kennel, the ratio of cats to dogs is 3 to 4. If there are 133 cats and dogs in the kennel, how many dogs are there?

20. State the domain of the function, using interval notation.

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

21. State the domain of the function, using interval notation.

$$f(x) = \frac{x - 5}{x + 9}$$

22. Simplify the following expression. If the expression is not a real number, indicate "Not a Real Number".

$$\left(\frac{27}{64}\right)^{\frac{2}{3}}$$

23. The distance that a free falling object falls is directly proportional to the square of the time it falls (before it hits the ground). If an object fell 145 ft in 3 seconds, how far will it have fallen by the end of 9 seconds? (Leave the constant of variation in fraction form or round to at least 2 decimal places. Round your final answer to the nearest foot.)

24. Divide using the division algorithm. Write your answer in the form $Q + \frac{R}{D}$ where the degree of R is less than the degree of D .

$$\frac{8x^2 - 2x + 5}{4x + 3}$$

25. Simplify the following radical.

$$\sqrt{-27}$$

26. Find the distance between the points P and Q and the midpoint of the segment PQ.

$$P(3, 7) \text{ and } Q(-1, 9)$$

27. Solve the equation.

$$3x^3 + 10x^2 = 8x$$

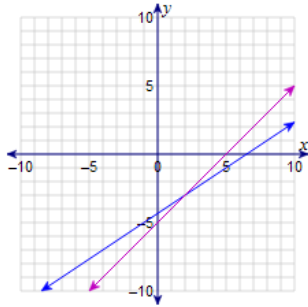
28. Find the quotient. Express your answer in standard form.

$$\frac{-3 + 2i}{7 - 4i}$$

29. Find the center and radius of the circle.

$$(x - 8)^2 + (y + 9)^2 = 25$$

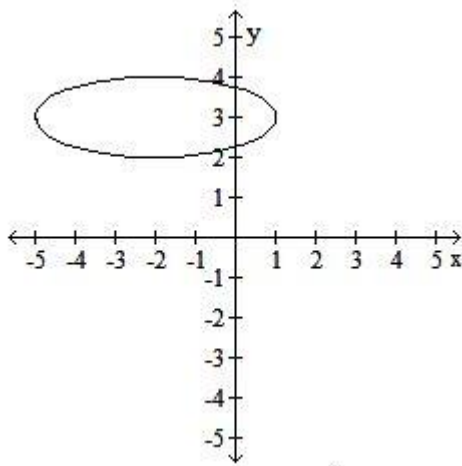
30. Determine the solution of the system of equations represented by the lines in the graph. Check your solution by substituting into both equations.



31. Find the equation (in slope-intercept form) of the line passing through the points with the given coordinates.

$(6, 2)$, $(3, -2)$

32. Find the domain and range of the relation. Express your answers in interval notation.



33. Write an equation, in slope-intercept form, of the line through the given point, P , and **perpendicular** to the given line.

$P(-5, 4)$; $5x - 4y = 9$

34. Evaluate the function at the specified value of x . Find $f(-4)$

$$f(x) = \begin{cases} -7x + 5 & \text{if } x < -6 \\ x^2 - 3 & \text{if } x \geq -6 \end{cases}$$

35. Evaluate the function at the specified value of x . Find $f(-7)$

$$f(x) = \begin{cases} -9x + 7 & \text{if } x > -4 \\ x^2 - 3 & \text{if } x \leq -4 \end{cases}$$

36. Evaluate the expression.

$$(f - g)(-4) \text{ when } f(x) = 2x^2 + 3 \text{ and } g(x) = |x + 1|.$$

37. Find $(f \circ g)(x)$.

$$f(x) = 3x + 5 \text{ and } g(x) = \sqrt{x}$$

38. Find a 3rd-degree polynomial function with the given zeros.

$$\text{Zeros: } -2, 3, -4$$

39. Solve the equation.

$$\frac{2}{x^2 - 9} = \frac{1}{x^2} + \frac{1}{x^2 - 3x}$$

40. Solve the equation.

$$\frac{x}{x - 3} - \frac{2x + 3}{x^2 + x - 12} = \frac{x - 1}{x + 4}$$

41. Shirley and Jose, working together, can mow the lawn in 6 hours. Working alone, Jose takes three times as long as Shirley. How long does it take Shirley to mow the lawn alone?

42. Solve the equation.

$$\frac{2}{x - 3} + \frac{x}{x - 1} = \frac{x^2}{x^2 - 4x + 3}$$

43. Solve the inequality. Express the solution in interval notation.

$$\frac{5x + 17}{x^2 + 8x + 15} \leq \frac{2}{x^2 + 8x + 15}$$

44. A total of \$7000 is invested: part at 6% and the remainder at 10%. How much is invested at each rate if the annual interest is \$520?

45. Consider the function:

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

- a. Find the value of $f(-9)$.
- b. Find the value of $f(a)$.

46. Solve the inequality. Express the solution in interval notation.

$$\frac{4x + 13}{x^2 + 9x + 14} > \frac{5}{x^2 + 9x + 14}$$

47. Find the inverse function of f .

$$f(x) = \frac{-4x + 5}{3}$$

48. Graph the solution of the compound linear inequality.

$$y > -3x + 1 \text{ or } y \leq 2x - 3$$

49. Graph the solution of the compound linear inequality.

$$y \geq 3x - 2 \text{ and } y > -x$$

50. Solve the exponential equation.

$$2^{4x-3} = \frac{1}{32}$$

51. Solve the logarithmic equation.

$$\log_5(3x) - \log_5(x - 5) = \log_5 6$$

52. Solve the logarithmic equation.

$$\log(x + 3) + \log(x - 3) = \log 40$$

53. Solve the logarithmic equation,

$$\log_3(2x - 9) = 3$$

54. Solve the application. Use the formula $A = Pe^{rt}$

How long does it take for \$7500 to double if it is invested at 3.5% compounded continuously? Round your answer to one decimal place, if necessary.

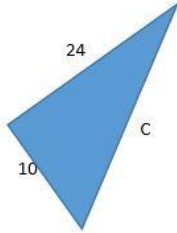
55. Find future population.

The population of a city is estimated to be declining according to the model $P(t) = 47000e^{-0.0035t}$, where t is the number of years from the present. What does this model predict the population will be in 5 years? Round your answer to the nearest person.

56. Perform the indicated operation of addition and reduce your answer to lowest terms.

$$\frac{x+3}{x+4} + \frac{x-4}{x-3}$$

57. Find the missing length.



58. Reduce the following rational expression to its lowest terms.

$$\frac{3y^2 + 14y - 24}{18 - 9y - 2y^2}$$

59. A rectangle has a length of 21 feet less than 5 times its width. If the area of the rectangle is 468 square feet, find the length of the rectangle.

60. Multiply the rational expressions and simplify.

$$\frac{4x^2 + 6x}{x^2 + 3x - 10} \cdot \frac{x^2 + 4x - 12}{x^2 + 5x - 6}$$

61. Simplify the complex rational expression.

$$\frac{\frac{9x^2 + 3}{27x^2}}{\frac{24x^2 + 8}{21x^4}}$$

62. Find the solution of the system.

$$\begin{cases} 16x + 2y = -30 \\ 2x + y = 3 \end{cases}$$

63. A dairy farmer wants to mix a 45% protein supplement and a standard 20% protein ration to make 1800 pounds of a high-grade 30% protein ration. How many pounds of each should he use?

64. Consider the function:

$$f(x) = 8x + 7$$

- a. Find the value of $f(-2)$.
- b. Find the value of $f(a + 3)$.

65. Simplify the following expression. If the expression is not a real number, indicate "Not a Real Number".

$$\left(\frac{25}{64}\right)^{\frac{-1}{2}}$$

66. Simplify the following complex fraction.

$$\frac{2 + \frac{1}{x}}{4 - \frac{2}{x}}$$

67. Find the solution of the system.

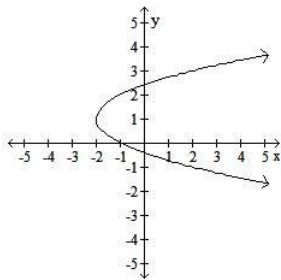
$$\begin{cases} y = -6x + 30 \\ -18x + 6y = -36 \end{cases}$$

68. Simplify the following expression. If the expression is not a real number, indicate "Not a Real Number".

$$-\left(\frac{64}{27}\right)^{\frac{-1}{3}}$$

69. Davia is working her way through school. She works two part time jobs for a total of 32 hours a week. Job A pays \$8.30 per hour and Job B pays \$10.20 per hour. How many hours did she work at each job in a week when she earned a total of \$301.70?

70. Find the domain and range of the relation. Express your answers in interval notation.



71. Solve the equation.

$$\frac{x}{x-4} - \frac{4}{2x-1} = 1$$

72. An airplane can travel 440 mph in still air. If it travels 950 miles with the wind in the same length of time it travels 810 miles against the wind, what is the speed of the wind?

73. z varies directly as x^2 and inversely as y^2 . If $z = 156$ when $x = 9$ and $y = 4$, find z if $x = 6$ and $y = 9$. (Round off your answer to the nearest hundredth.)

74. Perform the indicated operation of multiplication or division on the rational expressions and simplify.

$$\frac{9s^2}{8t^3} \div \frac{9s}{2t^2}$$

75. If Ryan has \$1161 left after spending $\frac{1}{5}$ of his monthly salary for rent and $\frac{1}{8}$ of his monthly salary for his credit card bill, what was his monthly salary?

76. Find the product. Express your answer in standard form.

$$-6i(3 - 7i)$$

77. Tai and Ly leave Ly's house at the same time. Tai drives north and Ly drives west. Tai's average speed is 9 mph slower than Ly's. At the end of one hour, they are 85 miles apart. Find Ly's average speed. (Round your answer to the nearest tenth.)

78. Find the standard form of the equation for the circle with the following properties.

Center $(-8, 9)$, passes through $(-1, 0)$

79. Solve the following compound inequality. Express your answer in interval notation.

$$-26 < 3x - 8 \leq 10$$

80. Solve the following radical equation.

$$\sqrt[3]{3x^2 + 2x} = 2$$

81. Find the equation of the line which passes through the point $(-4, 12)$ and is **parallel** to the given line. Express your answer in slope-intercept form.

$$2x + 5y = 7$$

82. Solve the following absolute value equation. If needed, write your answer as a fraction reduced to lowest terms.

$$|5x + 10| - 12 = 0$$

83. Consider the following functions.

$$f(x) = x \text{ and } g(x) = x^2 - 14$$

- Find $(f + g)(-2)$.
- Find $(f - g)(-2)$.
- Find $(fg)(-2)$.
- Find $\left(\frac{f}{g}\right)(-2)$.

84. Find all zeros of the following polynomial. Be sure to find the appropriate number of solutions (counting multiplicity) using the Linear Factors Theorem.

$$f(x) = x^3 - 8x^2 + 22x - 20$$

85. Given that $-4i$ is a zero, factor the following polynomial function completely. Use the Conjugate Roots Theorem, if applicable.

$$f(x) = x^4 + 3x^3 - 2x^2 + 48x - 288$$

86. Use synthetic division to determine if the given value for k is a zero of this polynomial. If not, determine $p(k)$.

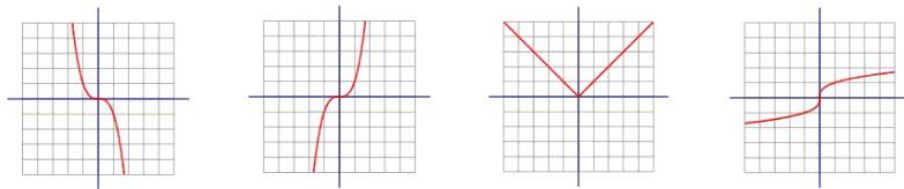
$$p(x) = 2x^3 - 6x^2 - 6x - 13; k = 4$$

87. Find the solution of the following polynomial inequality. Express your answer in interval notation.

$$x^2(x + 1)(x - 3) > 0$$

88. Identify the general shape of the graph of the following function.

$$u(x) = \frac{4}{3}|x|$$



89. The total revenue for Jane's Vacation Rentals is given as the function $R(x) = 300x - 0.5x^2$, where x is the number of rooms rented. What number of rooms rented produces the maximum revenue?

90. An arrow is launched upward with a velocity of 256 feet per second from the top of a 100-foot platform. What is the maximum height attained by the arrow?

91. Find $(f \circ g)(-4)$ for the following functions.

$$f(x) = 3x \text{ and } g(x) = x^2 - 3$$

92. Construct a polynomial function with the stated properties. Reduce all fractions to lowest terms. Third-degree, with zeros of -2 , -1 , and 3 , and passes through the point $(4, 7)$.

93. Consider the following function.

$$p(x) = -2\sqrt{x-3} + 5$$

- a. Describe how the graph of a related basic function is transformed by shifting, reflecting, stretching or compressing to obtain the graph of the given function.
- b. Determine the domain and range of the given function. Express your answer in interval notation.
94. Use the properties of logarithms to expand the following expression as much as possible. Simplify any numerical expressions that can be evaluated without a calculator.

$$\ln\left(\frac{7x^7}{y^8}\right)$$

95. Dolores invests \$8200 in a new savings account which earns 5.9% annual interest, compounded quarterly. What will be the value of her investment after 3 years? Round to the nearest cent.

96. Evaluate the following logarithmic expression. Round off your answer to two decimal places.

$$\log_{15}(478)$$

97. Graph the following rational function.

$$f(x) = \frac{-7}{x^2-25}$$

98. The length of a rectangle is 4 inches less than 5 times the width. If the perimeter of the rectangle is 64 inches, find the length and width of the rectangle.

99. Find the difference and reduce to lowest terms.

$$\frac{3}{x-5} - \frac{4x-5}{x^2-10x+25}$$

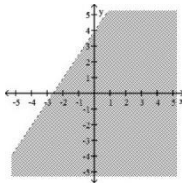
100. At a new television plant, 6 out of 50 televisions produced are defective. If the daily production is 900 televisions, how many are defective?

Answer Key

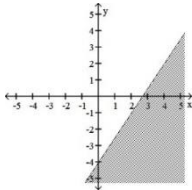
1. $(5, -7)$

2. 23

3.

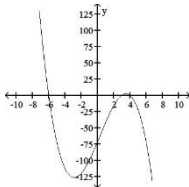


4.



5. $1 - 57i$

6.



7. x-int: $(\frac{12}{5}, 0)$ y-int: $(0, -2)$

8. $(-\infty, \frac{-11}{3}) \cup (1, \infty)$

9. $[-4, 7]$

10. $x = \frac{-3}{7}$

11. $x = \{1, 6\}$

12. $x = \frac{83}{3}$

13. $x = 5$

14. $x = \frac{-9 \pm \sqrt{41}}{10}$

15. $x = \frac{-4 \pm i\sqrt{5}}{3}$

16. $x = 5 \pm 3i\sqrt{2}$

17. $x = \{-11, -7\}$

18. $x = \pm 2\sqrt{3}$

19. 76 dogs

20. $(-\infty, 0) \cup (0,$

21. ~~6)~~ $\infty, -9) \cup (-9, \infty)$

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

23. 1305 ft

24. $2x - 2 + \frac{11}{4x+3}$

25. $3i\sqrt{3}$

26. $2\sqrt{5}$ and $(1, 8)$

27. $x = \{-4, 0, \frac{2}{3}\}$

28. $\frac{-29}{65} + \frac{2}{65}i$

29. center = $(8, -9)$ radius = 5

30. $(2, -3)$

31. $y = \frac{4}{3}x - 6$

32. D: $[-5, 1]$ R: $[2, 4]$

33. $y = \frac{-4}{5}x$

34. 13

35. 46

36. 32

37. $3\sqrt{x} + 5$

38. $x^3 + 3x^2 - 10x - 24$

39. no solution

40. $x = 1$

41. 8 hours

42. $x = -2$

43. $(-\infty, -5)$

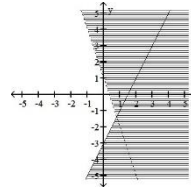
44. \$4500 at 6% ; \$2500 at 10%

45. a. 215 b. $3a^2 + 4a + 8$

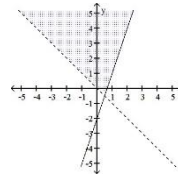
46. $(-7, -2) \cup (-2, \infty)$

47. $f^{-1}(x) = \frac{5-3x}{4}$

48.



49.



50. $x = \frac{-1}{2}$

51. $x = 10$

52. $x = 7$

53. $x = 18$

54. 19.8 years

55. 46,185 people

56. $\frac{2x^2-25}{(x+4)(x-3)}$

57. $c = 26$

58. $\frac{3y-4}{3-2y}$

59. 39 ft

60. $\frac{2x(2x+3)}{(x+5)(x-1)}$

61. $\frac{7x^2}{24}$

62. $x = -3, y = 9$

63. 720 lbs of 45% protein supplement; 1080 lbs of 20% protein ration

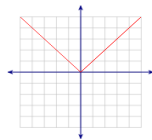
64. a. -9 b. $8a + 31$

65. $\frac{8}{5}$

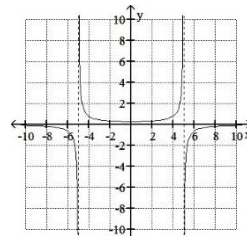
66. $\frac{x(2x-1)}{2(2x^2-1)}$

67. $x = 4, y = 6$

68. $\frac{-3}{4}$
 69. Job A: 13 hours and Job B: 19 hours
 70. D: $[-2, \infty)$ R: $(-\infty, \infty)$
 71. $x = -3$
 72. 35 mph
 73. $z = 13.70$
 74. $\frac{s}{4t}$
 75. \$1720
 76. $-42 - 18i$
 77. 64.4 mph
 78. $(x + 8)^2 + (y - 9)^2 = 130$
 79. $(-6, 6]$
 80. $x = \{-2, \frac{4}{3}\}$
 81. $y = \frac{-2}{5}x + \frac{52}{5}$
 82. $x = \{\frac{-22}{5}, \frac{2}{5}\}$
 83. a. -12 b. 8 c. 20
 d. $\frac{1}{5}$
 84. $2, 3 + i, 3 - i$
 85. $f(x) = (x + 4i)(x - 4i)(x + 6)(x - 3)$
 86. No, -5
 87. $(-\infty, -1) \cup (3, \infty)$
 88.



89. 300 rooms
 90. 1124 ft
 91. 39
 92. $f(x) = \frac{7x^3 - 49x - 42}{30}$
 93. a. $f(x) = \sqrt{x}$ is shifted 3 units right, stretched by a factor of 2, reflected across the x-axis, and shifted 5 units up.
 b. Domain: $[3, \infty)$; Range: $(-\infty, 5]$
 94. $\ln(7) + 7 \ln(x) - 8 \ln(y)$
 95. \$9775.13
 96. 2.28
 97.



98. length: 26 in width: 6 in
 99. $\frac{-x-10}{x^2-10x+25}$
 100. 108 televisions