

## Math 0250 Final Review Questions

In problems 1 – 6, perform the indicated operations and simplify if necessary.

- |                              |                               |
|------------------------------|-------------------------------|
| 1. $3\sqrt{128} - 6\sqrt{8}$ | 2. $3\sqrt{-27} - 6\sqrt{-3}$ |
| 3. $(3 + 5i) - (-1 + 4i)$    | 4. $(8 - 3i)^2$               |
| 5. $(2 - 9i)(3 + 7i)$        | 6. $(2 - 5i)(2 + 5i)$         |

In problems 7-11, solve the following applications. Define the variable(s), state the equation(s), solve the equation(s), and state the solution in a complete sentence.

7. On a freeway a car travels 250 miles in the same time that a truck travels 225 miles. If the rate of the car is 8 miles per hour faster than the rate of the truck, find both rates.
8. Mr. Nygen wants to diversify his portfolio by investing a total of \$15,000 in two accounts, one is high risk paying 4% simple annual interest and the other is low risk paying 3% simple annual interest. If he wants to earn \$550 annual interest, how much should he invest at each rate?
9. At a concession stand, three hot dogs and four hamburgers cost \$35.25; four hot dogs and three hamburgers cost \$33.00. Find the cost of one hot dog and one hamburger.
10. Amie plans to use one-fourth the area of her 48-foot-by-100-foot rectangular back yard to plant a garden. Find the perimeter of the garden if the length is to be 40 feet greater than the width.
11. If the length of each side of a square is increased by 4 inches, the area of the larger square becomes 9 times greater than the area of the original square. Find the perimeter of the original square.

12a. State the values of  $x$  that are not in the domain of this rational function.  $f(x) = \frac{7x + 7}{2x^2 + 5x + 3}$

12b. State the domain of the rational function.  $f(x) = \frac{7x + 7}{2x^2 + 5x + 3}$

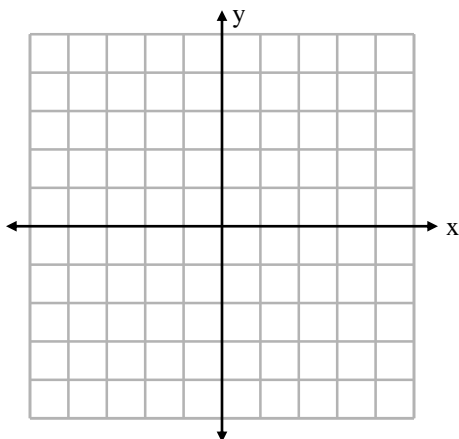
13. How is  $f(x)$  pronounced and what does it really mean?
14. If  $f(x) = x^2 + 6$  and  $g(x) = 3x - 4$ , find  $f(7) + g(7)$ .
15. If  $f(x) = x^2 + 6x - 5$ , find  $f(-1)$  and  $f(a + 1)$ .

For problems 16 – 17, find the inverse of the given function; find  $f^{-1}(x)$ .

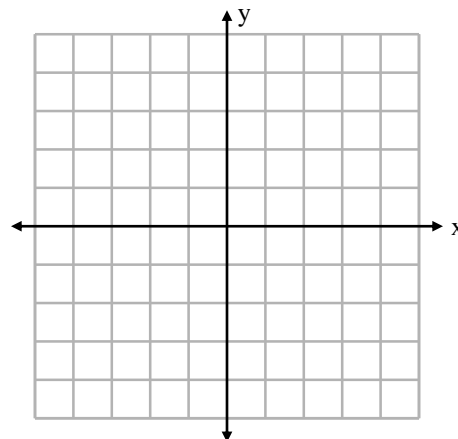
16.  $f(x) = (x - 3)^3$

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

18. Graph  $f(x) = 2x - 5$

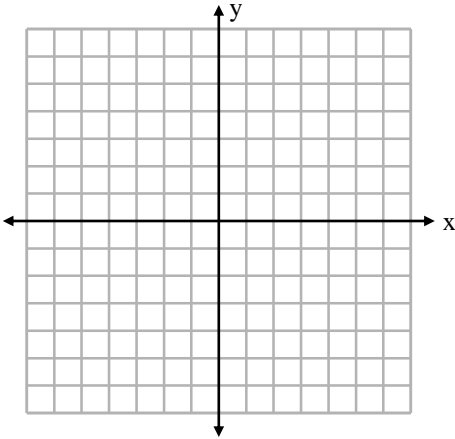


19. Graph  $3x - 4y = -12$

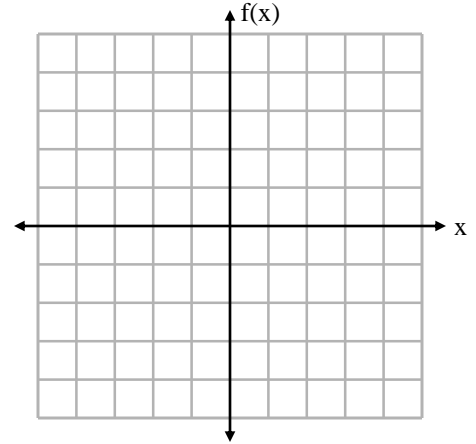


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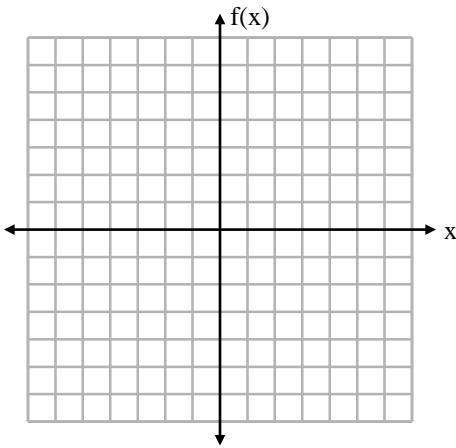
20. Graph  $x = 6$



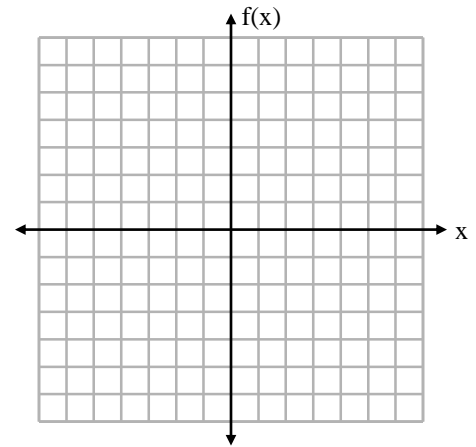
21. Graph  $f(x) = -3$



22. Graph  $f(x) = \sqrt{x + 3} + 1$   
State the Domain and Range



23. Graph  $f(x) = (x + 2)^2 - 5$   
State the Domain and Range

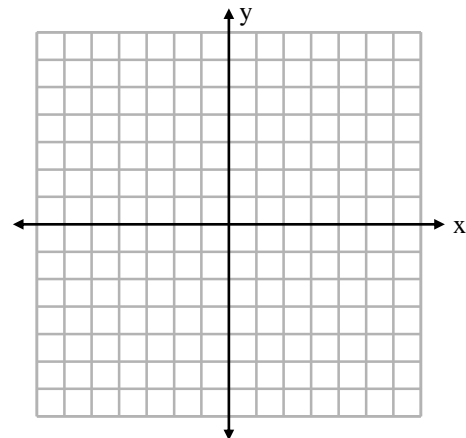


24. Find the equation of a line passing through points  $(-2, 3)$  and  $(1, -4)$ . Write your final answer in both Slope-Intercept form and Standard form.

25. Find the equation of a line passing through point  $(3, 1)$  and perpendicular to the line with equation  $3x - 2y = -5$ . Write your final answer in both Point-Slope form and Standard form.

26. Solve the system of equations by graphing.

$$\begin{cases} y = -4x \\ 4x + y = 5 \end{cases}$$



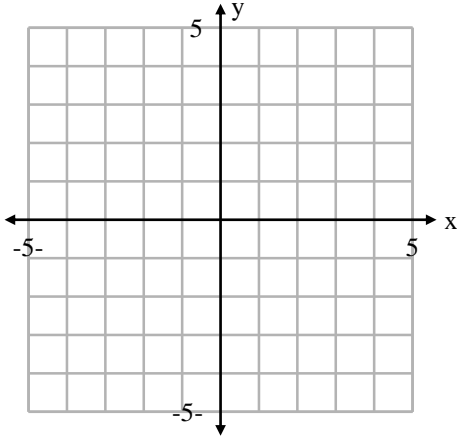
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In problems 27 – 28, solve the systems of equations. One must be by the elimination (ie. addition) method and the other by substitution method.

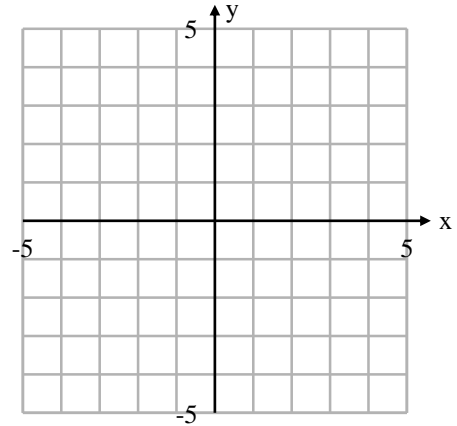
$$27. \begin{cases} 4x + 6y = 11 \\ 6x = -4y + 9 \end{cases}$$

$$28. \begin{cases} 2x + 4y = 4 \\ 3x + 2y = 0 \end{cases}$$

$$29. \text{ Graph } y \geq \frac{3}{2}x - 1$$



$$30. \text{ Graph } 2x - y > -5$$



31. Simplify. Use only positive exponents in the reduced answer.

$$\frac{(5x^7)^3(-2x)}{(3x^4)^2(15x^3)^2}$$

For problems 32-34, perform the indicated operations and simplify if necessary.

$$32. \frac{3x-1}{x^2+5x+6} - \frac{4}{x+3}$$

$$33. (2a-7b)^2$$

$$34. \frac{a^2-6ab+9b^2}{4a^2-36b^2} \div \frac{a-3b}{15a^2+45ab}$$

For problems 35-36, factor completely.

$$35. 250-54t^3$$

$$36. (5n+1)^2 + 2(5n+1) - 3$$

For problems 37-39, solve the following equations by factoring.

$$37. 3x^2 = 8 - 10x$$

$$38. 3x^3 - 6x^2 = 45x$$

$$39. 2(4x-3)^2 + 7(4x-3) + 5 = 0$$

Solve by completing the square.

$$40. x^2 + 7x - 1 = 0$$

For problems 41-42, solve the following equations that are quadratic in form.

$$41. z^4 - 13z^2 + 36 = 0$$

$$42. \frac{6}{x} = 2 + \frac{x}{x+1}$$

For problems 43-45, solve using the method of your choice.

$$43. 3x^2 - 4x = 4$$

$$44. (x-5)^2 = 24$$

$$45. 2x^2 - 3x - 5 = 2$$

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For problems 46-48, solve the equations for  $x$ . If the solutions are complex, write them in  $a + bi$  form.

46.  $4x^2 + 49 = 0$

47.  $(x - 1)^2 = -50$

48.  $2x^2 - 6x + 5 = 0$

Solve problems 49-52 and state the solution in interval notation.

49.  $x^2 + 7x + 10 < 0$

50.  $2x^2 + 18x \geq -36$

51.  $|4x + 3| \geq 19$

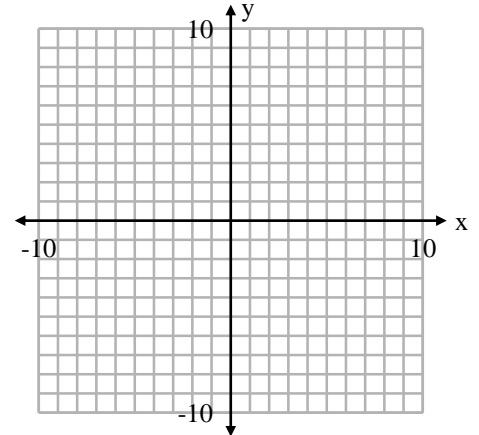
52.  $|-3x - 4| < 20$

53. Sketch  $y + 9 = (x + 3)^2$  and find:  
vertex \_\_\_\_\_

$x$ -intercept(s) \_\_\_\_\_

$y$ -intercept \_\_\_\_\_

equation axis of symmetry \_\_\_\_\_

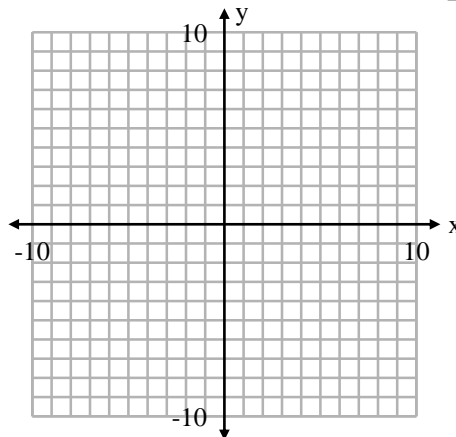


54. Sketch  $f(x) = 2x^2 - 3x - 6$  and find:  
vertex \_\_\_\_\_

$x$ -intercept(s) \_\_\_\_\_

$y$ -intercept \_\_\_\_\_

equation axis of symmetry \_\_\_\_\_



For problems 55-60, solve the equations for  $x$ .

55.  $|7x + 12| = |x - 8|$

56.  $3|2x - 3| + 4 = 13$

57.  $\frac{5}{x} + \frac{1}{3} = \frac{6}{x}$

58.  $\frac{x + 6}{3x - 12} = \frac{5}{x - 4} + \frac{2}{3}$

59.  $\sqrt{8x - 3} + 2 = 11$

60.  $\sqrt{2x + 4} + 2 = \sqrt{3x + 16}$

61. Simplify the expression. Assume all variables represent positive real numbers. Rationalize the denominator in your final answer.  $\sqrt{\frac{242t^9}{u^{11}}}$

62. Simplify the expression. Write the final answer with positive exponents.

$$\left(-\frac{8x^3}{27}\right)^{\frac{1}{3}}$$

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For problems 63-65, simplify the complex fractions.

$$63. \frac{\frac{2}{k+3}}{\frac{4}{k^2+4k+3}}$$

$$64. \frac{\frac{1}{x} - \frac{1}{y}}{\frac{2}{xy}}$$

$$65. \frac{2x^{-1} + 5}{4x^{-2} - 25}$$

66. If  $x = -4$ , evaluate the expression  $2^{x+2}$ .

For problems 67-69, solve the equations. Round the answer to the nearest hundredth where appropriate.

67.  $3^x = 7$

68.  $e^x = 14$

69.  $3^{4x+8} = 81$

Rewrite the following expressions as a single logarithm.

70.  $\log_2 x + \log_2 5$

71.  $5 \ln x - \ln y$

Write each logarithm as a sum and/or difference of logarithms. Simplify where possible.

72.  $\log_3(a^3b)$

73.  $\ln\left(\frac{e}{3}\right)$

Solve the following equations for  $x$ : if necessary, answer as a simplified fraction.

74.  $\log_6(5x+1) = 2$

75.  $\log x = -3$

76. Using a calculator, approximate the following values to 3 decimal places

a)  $\ln 6 \approx$

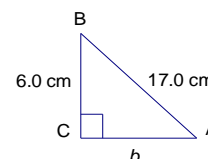
b)  $\log 5 \approx$

c)  $\sqrt[5]{22} \approx$

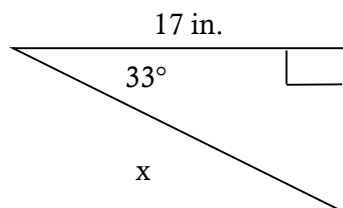
d)  $\log_5 136 \approx$

77. If a ship leaves port and sails east 56.7 miles and then turns south and sails for 25.9 miles, how far is the ship from port? Round the answer to the nearest tenth of a mile.

78. Solve the given triangle. Round each answer to the nearest tenth of a unit.



79. Use a calculator to find the value of  $x$  to the nearest tenth of an inch.



80. A very old white pine tree casts a shadow 40 feet long on the flat ground on a nice sunny day. Suppose the angle formed from the tip of the shadow on the ground to the top of the tree is  $65^\circ$ . Use a calculator to find the height of the tree rounded to the nearest tenth of a foot.