

(Sample Final exam for Spring 2017)

Intermediate Algebra

NAME _____

Final Exam Fall 2016

You will have 2 hours to complete this exam. You may use a calculator (TI-84 or lower, no cell phones) but must show all algebraic work in the space provided to receive full credit. Read all directions carefully, simplify all answers fully, and clearly indicate your answer. Good Luck!

Factor Completely. If the polynomial is prime, say so. (2pts each)

1. $5x^2 - 19x - 4$

2. $25 - 16x^2$

Perform the indicated operation and simplify completely. Leave complex answers in the form $a + bi$ and, where appropriate, rationalize all denominators. (3 pts each)

3. $\frac{4x-8}{x+2} \div \frac{8x-16}{x^2-4}$

4. $\frac{x^2}{x-3} + \frac{9}{3-x}$

Perform the indicated operation and simplify completely. Leave complex answers in the form $a + bi$ and, where appropriate, rationalize all denominators. (3 pts each)

5. $\frac{2x}{x^2-y^2} - \frac{1}{x-y}$

6. $\sqrt[3]{54x^5y^7}$

7. $\sqrt{\frac{2}{5}}$

8. $6\sqrt{18} - 9\sqrt{8}$

Perform the indicated operation and simplify completely. Leave complex answers in the form $a + bi$ and, where appropriate, rationalize all denominators. (3 pts each)

9. $(6 - \sqrt{7})(5 - \sqrt{7})$

10. $(9 - 7\sqrt{3}) - (6 - 5\sqrt{3})$

11. $(3 - i)(5 - 6i)$

12. $\frac{3}{5+3i}$

List any restrictions on the domain of each function below. (1pt each)

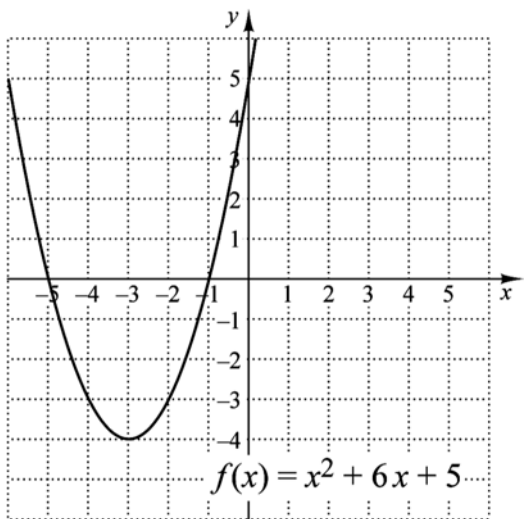
13. $f(x) = -5x^2 - 8x - 3$

14. $f(x) = \frac{x+1}{x^2-x-12}$

15. $f(x) = \sqrt{2-x}$

16. (2pts) Given $f(x) = 2x^2 - 5x - 7$, find $f(-1)$

17. Use the graph of the function below to determine the following. **(2pts each)**



a). Does the function have a maximum or a minimum value? And what is that value? _____

b). What is the range of the function? _____

c). What are the zeros of the function? _____

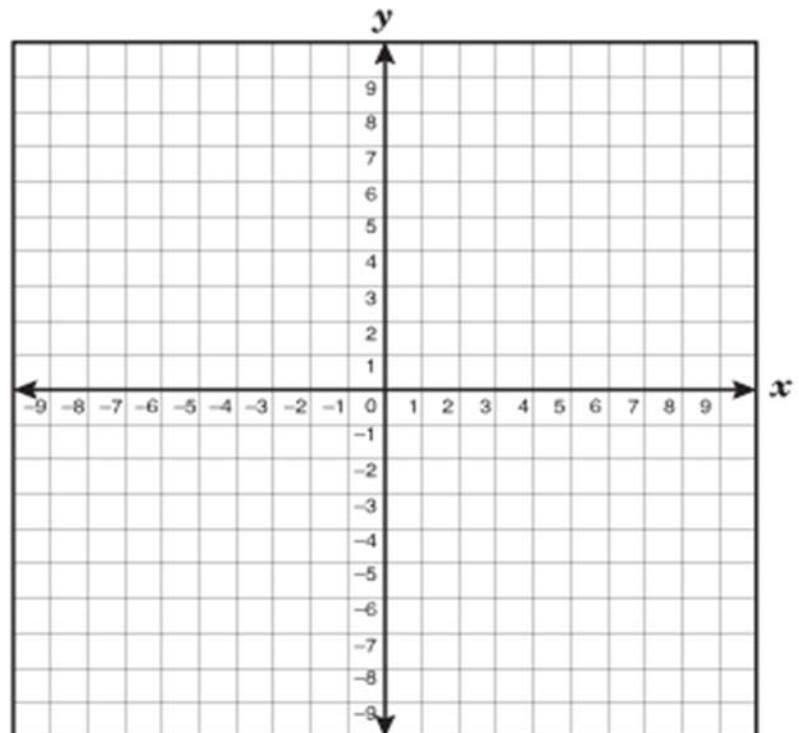
18. For the quadratic function $f(x) = x^2 + 4x - 5$, find the following and graph. **(2pts each)**

a). Vertex _____

b). x-intercept(s) _____

c). y-intercept _____

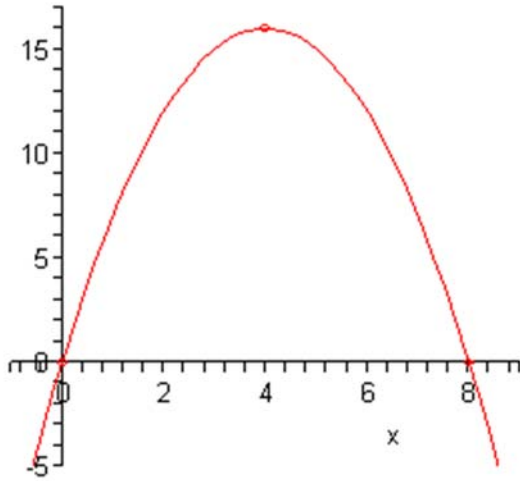
d). Graph to the right



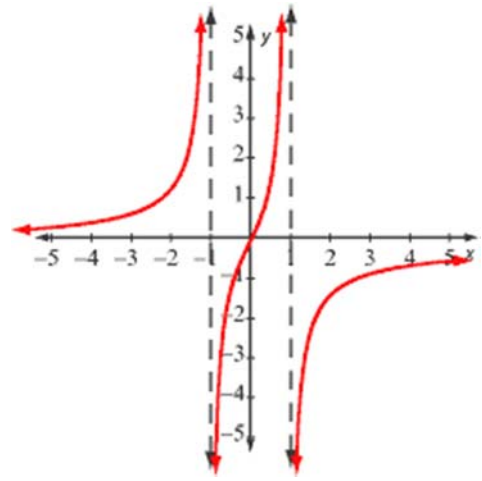
Match the graph to the type of function that best describes it. The same type may be used multiple times or not at all. (2pts each)

- a). Linear b). Quadratic c). Exponential d). Radical e). Rational

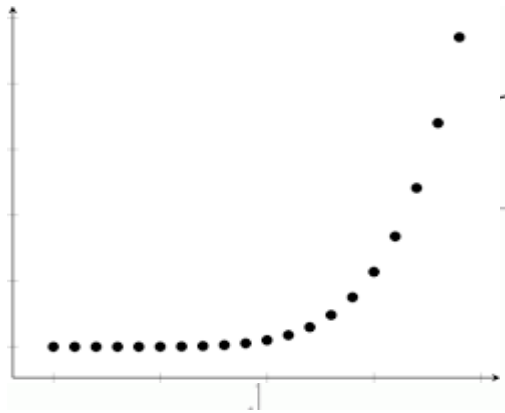
19. _____



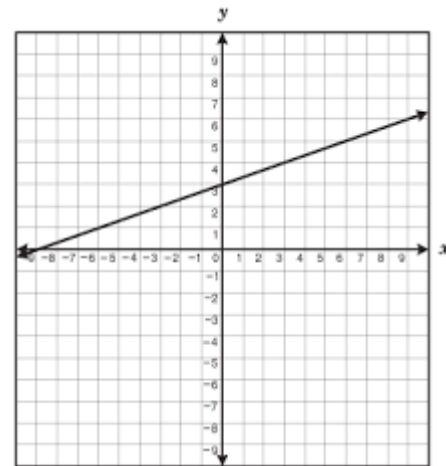
20. _____



21. _____



22. _____



Solve each equation below. Simplify completely, do not round. (3 pts each)

23. $15x^2 - 14x = 8$

24. $x = 3 + \sqrt{5 - x}$

25. $\frac{3}{x-3} + \frac{5}{x+2} = \frac{5x}{x^2-x-6}$

Solve each equation below. Simplify completely, do not round. (3 pts each)

26. $\sqrt[5]{1-3x} = -1$

27. $x^2 - 10x + 29 = 0$

Application Problems. For all problems where an equation is not given, you need to define your variable(s), set up an algebraic equation or equations, solve algebraically, and answer the question with the proper units. If an equation is given, be sure to answer the question completely and with proper units. (4 pts each)

28. The height of waves in a storm depends on the speed of the wind. Suppose $H(x) = 2x^2 - 38x - 35$ gives the maximum wave height H in feet for a wind speed x in knots (nautical miles per hour). For what wind speed would the maximum wave height be 5 feet?

29. Suppose that the number of pounds, $p(x)$, of meat per day recommended for a lion cub that is x days old is given by $p(x) = -0.2x^2 + 1.6x + 10.8$

a). At what age is the cub's consumption of meat maximum? (2 pts)

b). How many pounds of meat does the cub consume at its age of maximum meat consumption? (2 pts)

30. The diagonal of a rectangular gate is 50 feet. The horizontal distance that it spans is 10 feet longer than its height. Find the length and height of the gate.

Length of gate is: _____

Height of gate is: _____

31. Hans' boat travels 8 mph faster than Julie's. Hans travels 69 miles in the same time that Julie travels 45 miles. Find the speed of each person's boat.

Speed of Hans' boat is: _____

Speed of Julie's boat is: _____

32. Amy can paint her four-bedroom condominium three times as fast as her husband, Paul. If they work together, it takes them 12 hours to paint the condominium. How long would it take Paul to paint the entire condominium alone?

33. The base of a triangular board is 5 feet longer than its height. If the surface area of the board is 3 square feet, then find the base and height of the board.

Base of board is: _____

Height of board is: _____

Bonus (3pts)

There is a special 5-digit number that has the following features: If we put the numeral 1 at the beginning, we get a number three times smaller than if we put the numeral 1 at the end. What is that special 5-digit number?

Merry Christmas and Happy New Year!

