

SAMPLE Final Exam for Fall 2017

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. $3x^2 - 7x - 20$

2. $49 - 4x^2$

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. $\frac{3x-12}{x+4} \div \frac{5x-20}{x^2-16}$

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

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. $\frac{1}{x-1} - \frac{1}{x+1}$

6. $\sqrt[5]{64x^{11}y^8}$

7. $\sqrt{\frac{7}{3}}$

8. $5\sqrt{32} - 7\sqrt{50}$

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. $(3 - \sqrt{2})(5 + \sqrt{2})$

10. $(7 - 8\sqrt{7}) - (12 - 11\sqrt{7})$

11. $(2 + 3i)(4 - 7i)$

12. $\frac{5}{4 - 3i}$

State the domain of each function below. (1pt each)

13. $f(x) = 2x^2 - 7x + 5$

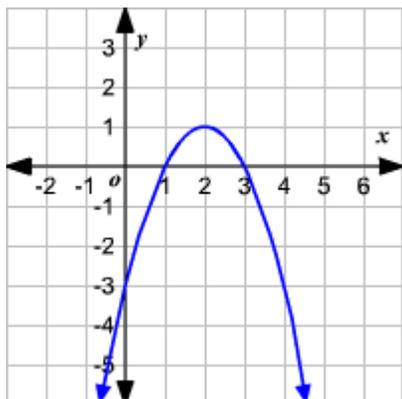
14. $f(x) = \frac{x-3}{x^2-6x+5}$

15. $f(x) = \sqrt{x-3}$

16. (2pts) Given $f(x) = 3x^2 - 7x + 9$, find $f(-2)$

17. Use the graph of the function below to determine the following.

a). Does the function have a maximum or a minimum value? And what is that value? **(2pts)** _____



b) What is the domain of the function? **(1 pt)** _____

c). What is the range of the function? **(1 pt)** _____

d). What are the zeros of the function? **(2 pts)** _____

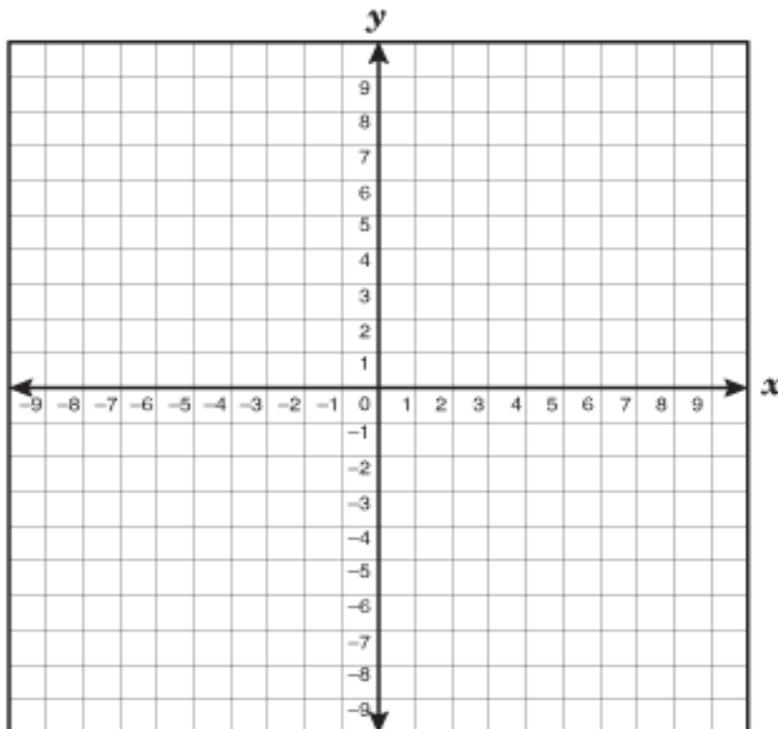
18. For the quadratic function $f(x) = x^2 + 6x + 5$, find the following and graph. **(2pts each)**

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

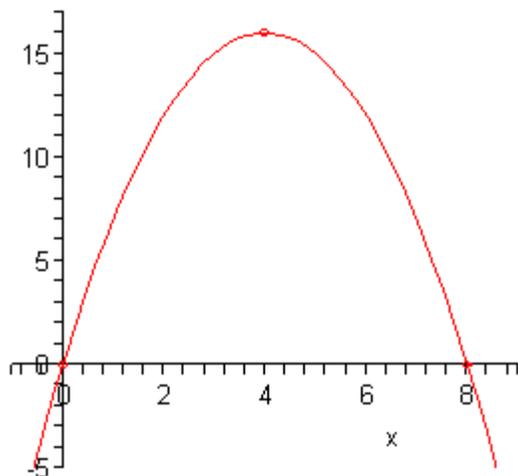
b). Quadratic

c). Exponential

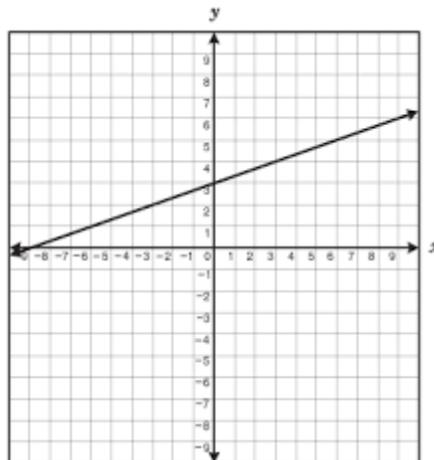
d). Radical

e). Rational

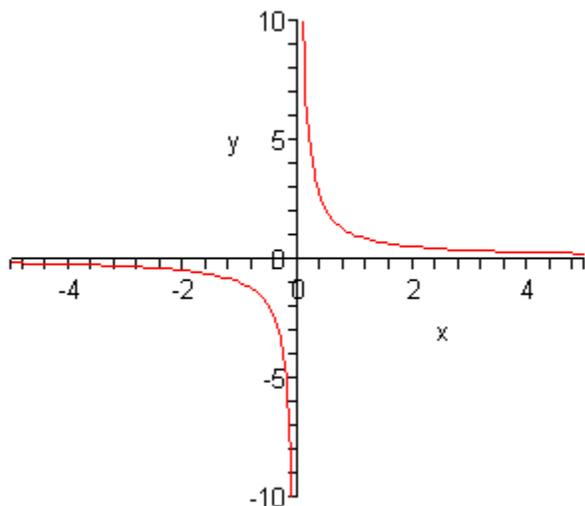
19. _____



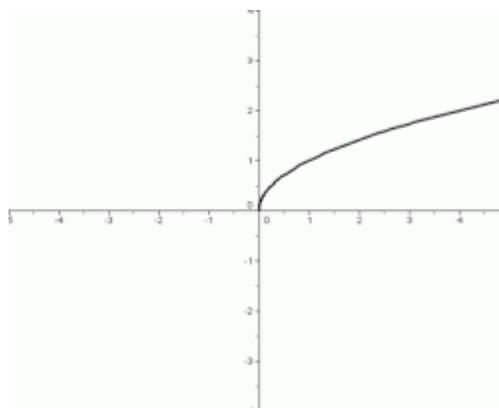
20. _____



21. _____



22. _____



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

23. $8x^2 - 3 = 10x$

24. $x = 6 + \sqrt{x}$

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

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

26. $\sqrt[7]{x-3} + 2 = 1$

27. $x^2 - 4x + 53 = 0$

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. Suppose $H(x) = -15x^2 + 75x + 10$ gives the height H in feet of a soccer ball x seconds after it is kicked. How long has the soccer ball been airborne if a fan sitting 100 feet above ground catches it on its way back down?

29. Suppose $p(x) = -x^2 + 980x - 3000$ gives the total profit in dollars made by a car dealership for selling x cars.

a). How many cars must be sold to maximize profit? (2 pts)

b). What is the maximum profit? (2 pts)

30. The height of a rectangular wall is 7 feet shorter than the horizontal distance that it spans. If the wall measures 13 feet diagonally, then find the height and length of the wall.

Length of wall is: _____

Height of wall is: _____

31. Kyle bikes 15 mph slower than Ellen does. Kyle travels 50 miles in the same time that Ellen travels 80 miles. Find the speed of each person.

Ellen's speed: _____

Kyle's speed: _____

32. Chelsea can rake her lawn twice as fast as Eric. If they work together, it takes them 5 hours to rake the lawn. How long would it take Eric to rake the lawn alone?

33. The height of a triangular coffee field is 1 mile shorter than its base. If the surface area of the field is 3 square miles, then find the base and height of the coffee field.

Base of coffee field is: _____

Height of coffee field is: _____

Bonus (3pts)

Simplify $\sqrt[3]{12 - \sqrt{18 - \sqrt{30 + \sqrt[4]{16}}}}$ completely to its exact value.

Have a Wonderful Summer Recess!

