Name: Algebra 2 Semester 1 2015 Final Exam Study Guide

NC = No calculator

Show your work on separate sheets of paper. You may need graph paper.

UNIT 1: SYSTEMS OF EQUATIONS

- 1. NC Solve the following system of equations: $\begin{cases} y = -\frac{5}{3}x + 3\\ y = \frac{1}{3}x 3 \end{cases}$
- a. What method (elimination, substitution, or graphing) would be best to solve this system? Why?



- b. Solve the system by graphing.
- c. Check your solution.
- 2. NC Solve the following system of equations: $\begin{cases} y = 6x 11 \\ -2x 3y = -7 \end{cases}$
 - a. Which method would be the best to use for this system? Why?
 - b. Solve the system by **substitution**.
- 3. NC Solve the following system of equations: $\begin{cases} 5x + y = 9\\ 10x 7y = -18 \end{cases}$
 - a. Which method would be the best to use for this system? Why?
 - b. Solve by **elimination**.
- 4. NC Solve the following systems of equations using the method of your choice.

a)
$$\begin{cases} y = 5x - 7 \\ -3x - 2y = -12 \end{cases}$$
 b) $\begin{cases} -4x + 9y = 9 \\ x - 3y = -6 \end{cases}$ c) $\begin{cases} y = \frac{1}{3}x - 3 \\ y = -x + 1 \end{cases}$

5. NC Graph the following system of inequalities. Then, circle the points below that are solutions to the system.

y <	< - 3x	<u>x – 4</u>
y ≥	$\geq \frac{1}{2}X -$	⊦3

Circle the solutions to the system:

(0,0)	(-4, 3)	(-7, 1)
(5,3)	(-2, -3)	(-3, -1)



- 6. **NC** Maria is hosting a party. She places an order at Pizza Hut for 5 pizzas and 4 breadsticks for a total of \$51. Halfway through the party, she realizes that she will need one more pizza and 2 more order of breadsticks. This time she was given a total of \$15. How much does a pizza cost? How much does a breadstick cost?
- 7. **NC** Saleh has to buy apples and bananas. A bunch of bananas is \$0.30 and an apple is \$0.50. He spends a total of \$7.00. He bought 3 times as many bananas as he did apples. How many apples did he buy? How many bananas did he buy?

UNIT 2: FAMILIES OF FUNCTIONS

1. NC Given the family name, find the parent equation and graph it. Determine the domain, range, and end behavior.



2. For the function a * f(x - b) + c, complete the table for the effects of each parameter. Name two examples of values for each situation and describe the effect in words.

a > 1 Examples: (One reflected, one not) Effect:	b ≥ 0 Examples: Effect:	$c \le 0$ Examples: Effect:
0 < a < 1 Examples: (One reflected, one not) Effect:	$b \le 0$ Examples: Effect:	$c \ge 0$ Examples: Effect:
a < 0 Examples: Effect:		

3. Graph the following functions. Find their domain and range.



4. For each graph below, determine whether it is a function. Then determine its domain and range in interval notation. Identify ONE solution to the function (point on the graph) and ONE solution to f(x) = 0 (x-intercept). If asked, write the equation for the graph (assume no vertical stretch or shrink).





5. For each graph, draw two lines connecting it to its matching **domain** and **end behavior**.

UNIT 3: QUADRATICS

- 1. Which form of the quadratic equation shows the minimum or the maximum value of the function without changing the form of the equation
- a) Standard form b) factored form c) vertex form
- 2. NC Which of the following equations shows the minimum or the maximum of h(x)? h(x) = 2 (x + 3) (x + 1) $h(x) = 2 (x + 2)^2 - 2$ $h(x) = 2x^2 + 8x + 6$ Does h(x) have a maximum or a minimum?
- 3. The John Deere Company has found that the revenue from sales of heavy-duty tractors is a function of the unit price p that it charges. The revenue R is

$$R = -\frac{1}{2}p^2 + 1900p$$

What unit price p should be charged to maximize revenue? What is the maximum revenue?

4. The sum of the areas of two square plots of land is 45 square feet. The length of the side of one of the squares is 3 feet more than the length of the side of the other. What is the length of the sides of each square area?

5. Find the area of the shaded region in the picture:



6. NC The graph below can be represented by which of the following equations:



- a) y = (x 2)(x + 1)b) b) y = (x - 1)(x + 2)c) c) y = (x + 1)(x + 2)d) y = (x - 1)(x - 2)
- d) d) y = (x 1)(x 2)
- 7. NC Select ALL of the functions that can represent the following graph



- a) $2x^2 + 4x + 3$ b) 2(x + 3)(x + 1)c) $2(x + 2)^2 - 2$ d) 2(x - 3)(x - 1)e) $2x^2 + 8x + 6$ f) $2(x - 2)^2 - 2$
- 8. Simplify each expression. Write your answer in a + bi format.

a. -3 + 6i - (-5 - 3i) - 8i c. $-6(4 - 6i)^2$

- b. (-2-i)(4+i)d. (6-2i) - (11+4i)
- 9. Solve the following equation using one of the following methods: quadratic formula, factoring, taking square roots, completing the square (don't forget to try GCF first).
- a. $(p-6)^2 = 9$ d. $x^2 + 4x + 6 = 0$
- b. $x^2 11x + 19 = -5$ e. $4x^2 2x = 5$
- c. $n^2 + 8n = 3n$ f. $3x^2 + 6 = 12$
- 10. How many times does each of the following functions intersect the x-axis?
- a. $y = 3x^2 + \frac{2}{3}x \frac{1}{3}$ b. $f(x) = \frac{4}{3}x^2 4x + 3$ c. $y = 2x^2 \frac{1}{2}x + \frac{3}{2}$

UNIT 4: EXPONENTIAL FUNCTIONS

- 1. Which of the following functions would be exponential functions? Give a rationale **for OR against** for each problem.
 - a) The total amount paid for gas over *x* number of weeks if Sara puts \$25 of gas in her car each week.
 - b) The value of a computer after *x* years if it depreciates 12% each year.
 - c) The total cost of a wedding for *x* people if you pay \$50/person.
 - d) The population of Jonesville after *x* years if the population decreases by 20 people each year.
- 2. Write an exponential model for the following situation: Hussein bought a house for \$115,000. The value of the house appreciates by 3% each year. Write a model for the value of the house after *x* years.
- 3. Write an exponential model for the following situation: Laurie bought some office furniture. For tax purposes, the value of the furniture depreciates by 13% each year. Write a model for the value of the furniture after *x* years.
- 4. Joe took a job for \$30,000 and gets an \$800 raise each year. Nora took a job for \$28,000 and gets a 3% raise each year. If this is a career choice and they are planning on staying in this job for the long term, who took the better deal? Explain.
- 5. The population of Berkeley can be modeled by the function $P(t) = 115,000(1.013)^t$ where *t* is the number of years after 2015.
 - a) What is the population of Berkeley in 2015?
 - b) Is Berkeley getting bigger or smaller? Explain.
 - c) What is the rate of increase/decrease each year?

SLOT: RATIONAL FUNCTIONS

1. Simplify the following rational expression: $\frac{5p+12}{3p+5} + \frac{13p+18}{3p+5}$

- 2. Solve the following rational equation, show your steps and indicate any extraneous solutions. $\frac{4}{x} = \frac{-3}{x+8}$
- Solve the following rational equation, show your steps and indicate any extraneous solutions.

$$\frac{3}{x} + \frac{4}{3x} = \frac{1}{3}$$

SLOT: RADICAL FUNCTIONS

1. Solve each following radical equation. Determine whether each solution is extraneous.

a.
$$\sqrt{3x-5} - 5 = 2$$

b.
$$\sqrt{90 - x} = x$$

c. $\sqrt{x-5} = \sqrt{10-2x}$