Name:
Recitation Instructor:
Recitation Day and Time:

Traditional College Algebra – FINAL EXAM – Spring 2015

Page 1/2 30 pts.	Page 3/4 30 pts.	Page 5/6 30 pts.	Page 7/8 30 pts.	Page 9/10 30 pts.	TOTAL 150 pts

Directions: You will find 20 problems listed below. The point value of each problem is given in parentheses. Please show all your work neatly and box your final answers. No notes or books are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed (in particular, calculators with a built-in CAS and/or QWERTY keyboard are not allowed). You have one hour and fifty minutes to complete this exam.

1. (9 points) Given the points A: $(5, 4)$ and B: $(-1, 6)$, find the following:

   (a) The slope of the line connecting points A and B.

   (b) The distance between points A and B.

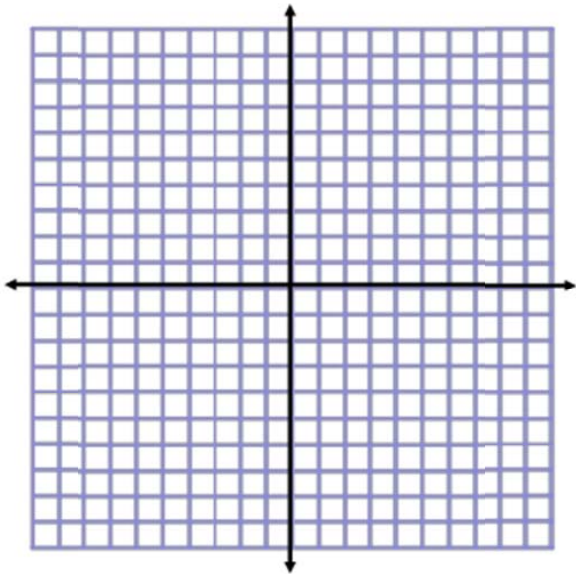
   (c) The midpoint of A and B.

2. (6 points) Find an equation for the graph that has the shape of x^3, but shifted left 6 units and upwards 10 units.

3. (7 points) Solve for x the equation: $4e^{x-1} - 5 = 23$. Leave exact (don't use a calculator).

4. (8 points) Solve: $|3x - 8| < 11$.

5. (10 points) Graph $-3x + 2y = 8$ and $4x + 3y = 6$ on the grid below. Label all intercepts clearly as ordered pairs (be sure to find x and y intercepts on both lines). Are the two lines parallel, perpendicular, or neither?



6. (5 points) Solve the quadratic equation $3x^2 + x - 5 = 0$.

7. (7 points) The profit function for selling x units of a certain product is given by $P(x) = -x^2 + 1000x + 380,000$. What number of units generates maximum profit, and, what is the maximum profit? Show your work with algebra.

8. (8 points) Simplify and write in standard form: $\dfrac{8-2i}{5+i}$

9. (7 points) Evaluate and complete the following function table for $f(x) = x^3 - 2Mx$, where M is some unspecified parameter. SHOW ALL WORK.

x	-2	-1	0	1	2
$f(x)$					

10. (8 points) Consider the polynomial function $p(x) = 3x^3 + 30x^2 + 171x + 246$. Confirm that $x = -2$ is one zero of $p(x)$, and use that fact to find the other zeros (real or complex) of $p(x)$.

11. (7 points) Solve the following rational equation: $\dfrac{x-7}{x-40} = \dfrac{x+1}{4x+5}$.

12. (8 points) Find $f^{-1}(x)$ when $f(x) = \log(3-2x)$.

13. (8 points) Using properties of logarithms and assuming all variables positive, answer the following:

(a) Expand completely: $\ln(xy^4z^2)$

(b) Condense into a single logarithmic expression the difference: $2\log(x) - 3\log(y)$.

14. (6 points) Suppose \$400 is invested in an account paying 2% annual interest, compounded continuously. Using an exponential growth model, determine the time required for the initial investment to triple.

15. (6 points) Solve the quadratic inequality $x^2 + 3x < 4$.

16. (10 points) Using the methods from lecture, find the inverse of the following matrix BY HAND:

$$\begin{pmatrix} 0 & -2 & 0 \\ 2 & 0 & 3 \\ 0 & 0 & 1 \end{pmatrix}$$

17. (8 points) Consider the rational function $r(x) = \dfrac{(4x+1)(x+7)}{x^2-8x+12}$.

(a) Find the vertical asymptotes of $r(x)$.

(b) Find the horizontal asymptote of $r(x)$.

(c) Find the zeros of $r(x)$.

(d) Find the y-intercept of $r(x)$.

18. (8 points) SET UP A SYSTEM OF EQUATIONS that will solve this problem. DO NOT SOLVE. Light roast coffee beans cost \$6.00/lb, while dark roast ones cost \$4.50/lb. How much of each type of coffee is needed to create 3.5 pounds of a mixture that costs \$5.00 per pound? Be sure to indicate the meaning of any variables used in setting up this problem.

19. (7 points) Given $g(x) = x^2 - 3x$ and $h(x) = 4x + 1$, find the following:

(a) $(h + g)(x)$

(b) $(hg)(x)$

(c) $h(g(x))$

20. (7 points) Solve the following system using either substitution, elimination, or the matrix inverse method:

$$4x + 3y = 4$$
$$5x + 2y = 9$$