Name:
Recitation Instructor:
Recitation Day and Time:

College Algebra – FINAL EXAM – Spring 2018

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: $(-5, 7)$ and B: $(-6, 1)$, find the following:

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

   (b) The distance between points A and B.

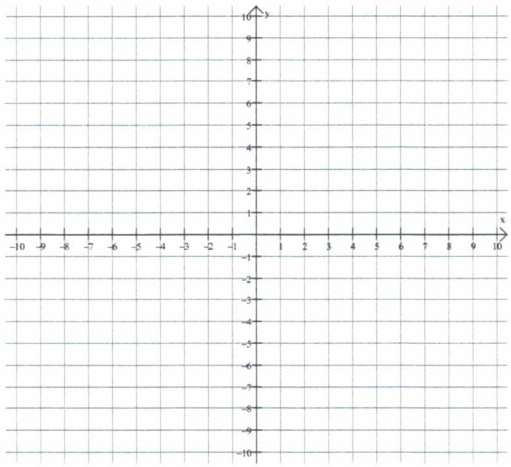
   (c) The midpoint of A and B.

2. (6 points) Find an equation for the graph x^2, but shifted right 5 units and downwards 6 units.

3. (7 points) Solve for x the equation: $4e^{x+2} - 7 = 9$. Leave exact (don't use a calculator).

4. (8 points) Solve: $|9x + 10| < 21$.

5. (10 points) Graph $-2x + y = 4$ and $4x + y = 2$ 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 $3(x - 4)^2 - 27 = 0$.

7. (7 points) Consider the function $P(x) = -2x^2+200x+18,000$. What is the vertex of this function? Show your work with algebra.

8. (8 points) Simplify and write in standard form: $\dfrac{6+2i}{9-4i}$

9. (8 points) Consider $g(x) = 4x^3 - dx$, where d is some external parameter. Answer the following:

   (a) Find $g(-3)$.

   (b) Find $g(2)$.

   (c) Find $g(-1)$.

   (d) Find $g(5)$.

10. (7 points) Consider the polynomial function $p(x) = 2x^3 + 20x^2 + 106x + 348$. Confirm that $x = -6$ 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: $\dfrac{7}{x+13} = \dfrac{3}{5x-1}$.

12. (8 points) Find $f^{-1}(x)$ when $f(x) = \ln(6x - 7)$.

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

(a) Expand completely: $\ln(x^3y^2z^4)$

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

14. (6 points) Suppose \$300 is invested in an account paying 4% annual interest, compounded continuously. Using an exponential growth model, determine the time required for the initial investment to quadruple.

15. (6 points) Solve the quadratic inequality $x^2 + 4x > 0$.

16. (10 points) Given matrices A and B below, find the product $A^{-1}B$. (Note: Treat a and c as unknown parameters in all your calculations.)

$$A = \begin{pmatrix} 3 & a \\ 0 & 2 \end{pmatrix}$$

$$B = \begin{pmatrix} 4 & 5 \\ 3 & c \end{pmatrix}$$

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

(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 the equations needed to solve this problem (do NOT solve): Cashews cost \$4.00/lb, raisins cost \$1.00/lb, and almonds cost \$4.50/lb. If there is twice as much raisins as there is of the cashews, how many pounds of each type of food is needed to create 5 pounds of a mixture that costs \$3.50 per pound? Be sure to indicate the meaning of any variables used in setting up this problem.

19. (7 points) Given $g(x) = x^2 + 4x$ and $h(x) = 3x - 5$, find the following:

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

(b) $(hg)(x)$

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

20. (7 points) Solve the following system using any of the of methods discussed in class (the calculator method is NOT allowed):

$$x - 3y = 4$$
$$2x + 2y = 1$$