Name:

Recitation Instructor/Time:

Pg 1 36 pts.	Pg 2 36 pts.	Pg 3 36 pts.	Pg 4 32 pts.	Pg 5 30 pts	Pg 6 30 pts	TOTAL 200 pts

COLLEGE ALGEBRA– FINAL EXAM – December 17, 2008

Directions: You will find 20 problems listed below. Please show all your work neatly and box your final answers. No notes or books are allowed. You have two hours to complete this exam.

1. (8 points) Express in terms of a single radical (no decimals allowed): $\sqrt{20} - 3\sqrt{45} + 2\sqrt{80}$

2. (8 points) Solve: $5(x+6) + 2x = 7(x-3) + 8(x+1)$.

3. (10 points) Solve and check your answers: $-4 \leq 5x + 1 \leq 4$.

4. (10 points) Solve and check your answers: $x + 8 = |5x + 4|$

5. (12 points) Given the points $(4, 9)$ and $(3, 2)$:

   (a) Find the slope of the line connecting the two points.

   (b) State the formula for a line in slope intercept form, identifying any symbols used.

   (c) Find the equation of the line connecting the two points. Write answer in slope-intercept form.

6. (12 points) Consider the equation $3x^2 - 5x - 4 = 0$.

   (a) State the quadratic formula, identifying any symbols used.

   (b) Solve the above equation using the quadratic formula.

7. (12 points) Consider the quadratic function $f(x) = 2x^2 - 5x - 3$.

   (a) Find the vertex of $f(x)$.

   (b) On what x-intervals is $f(x)$ increasing? Decreasing?

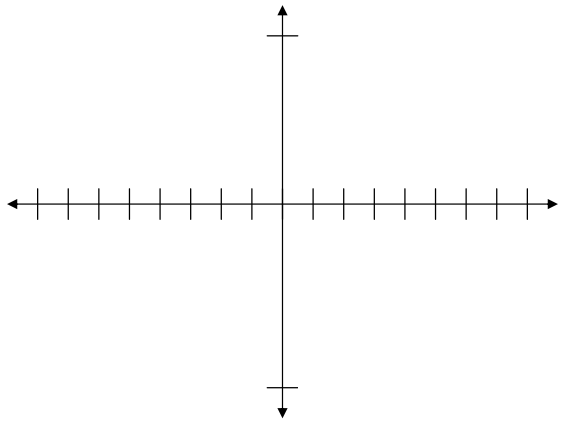
8. (10 points) Find a polynomial with a single zero at $x = 5$, a double zero at $x = 0$, and a single zero at $x = -3$. Multiply your answer out completely.

9. (14 points) Consider the polynomial $f(x) = x^4 + 2x^3 - 13x^2 - 14x + 24$.

   (a) List all possible rational zeros of $f(x)$.

   (b) Given that $x = 3$ and $x = -2$ are zeros of $f(x)$, find the other zeros of $f(x)$. You must show your work.

10. (a) (7 points) Using your graphing calculator, graph the function $f(x) = -2x^3 + 5x^2 + 15x - 30$ over the following intervals: $-8 \leq x \leq 8$ and $-75 \leq y \leq 75$. Find the x-intercepts and relative extrema. Include these points on your graph.



   (b) (5 points) Based on the graph above, solve the inequality $-2x^3 + 5x^2 + 15x - 30 > 0$

11. (8 points) Solve for x and check your work: $\sqrt{x+10} = x+4$.

12. (8 points) Simplify and present final answer in standard form: $\dfrac{1+i}{2-i}$.

13. (8 points) Using long division, find the slant asymptote of the rational function $f(x) = \dfrac{2x^2+5x+4}{x+1}$

14. Consider the system of equations $\begin{cases} x+4y=2 \\ 2x-2y=4. \end{cases}$

(a) (4 points) Solve the system using the method of substitution.

(b) (4 points) Solve the system using the method of elimination.

15. (10 points) Given $f(x) = x^2 + 3x$ and $g(x) = x + 1$, answer the following.

(a) Find $(f - g)(x)$ and simplify completely.

(b) Find $(f(g(x))$ and simplify completely.

16. (10 points)

(a) State the domain of $f(x) = \ln(x + 2)$.

(b) Solve for x: $\ln(x + 2) = 3$

17. (10 points) Answer the following questions about logarithms.

(a) Expand using properties of logarithm (you may assume all variables to be positive): $\log(xy^2z^3)$

(b) Condense into a single logarithmic expression using properties of logarithm (you may assume all variables to be positive): $4\log(x) - 2\log(y)$

18. (8 points) A rectangular poster has an area of of 2700 square inches. If the width is three-fourths the length, what is the perimeter of the poster? You must define any variables used and show all your work using algebra.

19. (8 points) Suppose \$400 is invested in an account paying 6% annual interest, compounded continuously. Assuming an exponential growth model, $P(t) = P_0 e^{rt}$, how long with it take for the initial investment to double? Show all work.

20. Suppose \$6200 is divided into 3 investment accounts paying 3%, 4% and 5% interest annually. If \$260 in simple interest is earned after one year, and twice the amount at 3% is invested at 5%, answer the following.

    (a) (6 points) Set up a system of 3 equations in 3 variables that would help determine how much money was invested in each account. DO NOT SOLVE.

    (b) (4 points) Write the augmented matrix corresponding to the system in part (a).

    (c) (4 points) Using RREF on your calculator, solve the system and label your answers.