MAT 099-G14 Final Test (10 pts) Name_____
100 Points NO GRAPHING CALCULATORS!!!

Do your own work. SHOW your work. When in doubt about how stupid I am, assume the worst.

1. Solve the following inequalities. Give the solution in set-builder notation and interval notation.

a. (10 pts) $|8x-5| \geq 3$

b. (10 pts) $|8x-5| \leq 3$

c. (5 pts) $|x-2| \leq -4$

d. (5 pts) $|x-2| > -4$

2. Solve the following equations, by any method, other than copying a classmate.

   a. (20 pts) $4x^2 - 12x + 7 = 0$

   b. (10 pts) $\frac{21}{x+5} - \frac{5}{x-3} = 8$

3. (10 pts) $\sqrt{19 - 2x} = x - 2$

4. (10 pts) Simplify $\frac{\left(6x^{-3}y^{4}\right)^{3}}{\left(10x^{5}y^{-1}\right)^{4}}$. Assume all variables represent nonnegative real numbers. Your final answer should contain only positive exponents.

5. (20 pts) Simplify $\frac{12 \pm \sqrt{32}}{8}$

6. (20 pts) Answer one of the following.
   a. A man bought a book on sale at a 20% discount. If he paid $37.00 at the register (after the discount!), what was the original price of the book (before the discount!).
   b. John can paint a room in 7 hours. Jane can paint a room in 5 hours. How long does it take them, working together?

7. (10 pts) Solve $x^2 - 8x - 19 = 0$ by completing the square.

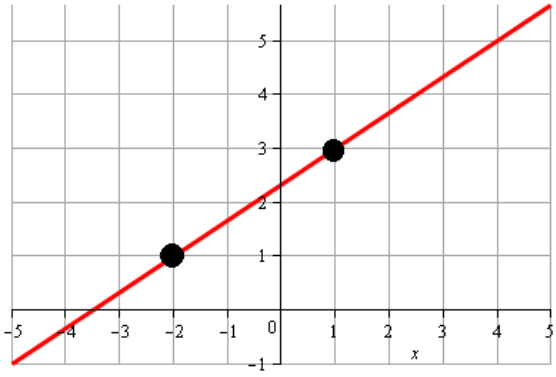
8. (10 pts) Re-write the function $f(x) = x^2 - 8x - 19$ in the form $a(x-h)^2 + k$ and sketch the graph. Your graph should include Vertex, both *x*-intercepts and the *y*-intercept.

9. (10 pts) Use synthetic division to determine $f(3)$ for $f(x) = 3x^4 - 2x^3 - 5x^2 + 7x - 11$. In other words, divide $f(x)$ by $x - 2$, using synthetic division, and interpret!

10. (10 pts) Use long division to determine the quotient and remainder for $\frac{3x^4 - 5x^2 + 7x - 11}{x^2 - 2}$. Write your final answer in the form of $Dividend = (Divisor)(Quotient) + Remainder$

11. (10 pts) Sketch the graph of the system of inequalities: $\begin{array}{c} 3x - 2y \geq 6 \\ 7x + 3y \geq 21 \\ x \geq 0 \\ y \geq 0 \end{array}$. Clearly label the "Good Stuff!"

12. (20 pts) Write an equation for the line shown in the picture:



Answer up to 2 bonus questions for up to 20 points. I will grade the first 3 you do work on, unless you tell me to omit them.

1. (10 pts) Consider the equation $ax^2 + bx + c = 0$. Write the discriminant.
2. (10 pts) What's the solution of the equation $ax^2 + bx + c = 0$?
3. (10 pts) Solve $3x^2 - 2x + 5 = 0$ by completing the square.
4. (10 pts) Write $\dfrac{3+2i}{8-7i}$ in the standard form $a + bi$.
5. (5 pts) Use Pascal's triangle to expand $(3x - 2i)^3$