Name:_____

Test 1
Fall 2006
MATH 111 Section 04
September 7, 2006

Directions : You have 75 minutes to complete all 6 problems on this exam. There are a possible 100 points to be earned. You may not use your book, notes, or any graphing/programmable calculator. Please be sure to show all pertinent work. *An incorrect answer with no work will receive no credit!* If any portion of the exam is unclear please come to me and I will elaborate provided I can do so without giving away the problem.

1. (10 points)
   Solve the following inequalities, and express the solutions in terms of intervals if possible.

$$\frac{2}{2x+3} \leq \frac{2}{x-5} \qquad\qquad 2|-11-7x|-2>10$$

2. (20 points)
Prove that the points $A = (1, 1)$, $B = (2, 4)$, and $C = (8, 2)$ are the vertices of a right triangle.

3. (10 points)
The set of points (x, y) that satisfy the equation

$$x^2 + y^2 - 10x + 18 = 0$$

forms a circle. Find the center and radius of the circle.

4. (20 points)
Let $Q = (1, 2)$ and $R = (-1, -1)$.

   (a) Find the equation of the line ℓ through the points Q and R.

   (b) Find the equation of the line ℓ_2 through the midpoint of the line segment with endpoints Q and R.

   (c) Find the x and y intercepts of ℓ_2.

5. (20 points)
   A person bitten by a zombie will turn into a zombie themselves. Bud is turned into a zombie at 1:00am and by 6:00am has bitten 12 people. Given that Bud can continue to bite people at this rate, find an equation describing how many people have turned into zombies as a direct result of a Bud bite after t hours.

6. (20 points)
   A farmer (Jim) is interested in (quickly) constructing a fence consisting of two areas. One area will hold people bitten by zombies who have not yet turned and the other will hold full fledged zombies. He has 1000 yards of fencing to construct the fence. Find the dimensions that will maximize the area enclosed.