Name:_____

Test 1
Fall 2006
MATH 111 Section 02
September 13, 2006

Directions : You have 50 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 inequality, and express the solutions in terms of intervals if possible.

$$\frac{3}{x+3} \leq \frac{2}{x-5}$$

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

   $$x^2 + y^2 - 14y - 15 = 0$$

   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 through the points Q and R.

(b) Find the equation describing the set of points that lie on the perpendicular bisector of the segment with endpoints Q and R.

5. (20 points)

A person bitten by a zombie will turn into a zombie themselves. Leah is turned into a zombie at 11:00am and by 8:00am has bitten 13 people. Given that Leah can continue to bite people at this rate, find an equation describing how many people have turned into zombies as a direct result of Leah's bite after t hours.

6. (20 points)

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