Quiz 4

Name: _____ Section: _____

Answer all 5 questions for a total of 100 points. Write your solutions in the space provided and put a box around your final answers. Answers can be left as logarithmic/exponential expressions, or a calculator can be used to write your answers numeriacally.

1. (25 points) The equation

$$x^2 - xy + y^2 = 3$$

represents a "rotated ellipse", that is, an ellipse whose axes are not parallel to the coordinate axes. Find the points at which this ellipse crosses the x-axis (i.e. x-intercepts) and show that the tangent lines at these points are parallel (i.e. have the same slope).

adamski@fordham.edu

2. (10 points) Find the derivative of $f(x) = \ln\left(\sqrt{\dfrac{3x+2}{3x-2}}\right)$.

   Hint: the calculus will be much easier if you first apply log laws to $f(x)$.

3. (20 points) Suppose a sample of radioactive material has an initial mass of 92.3 grams and decays exponentially. If its mass 10 days later is 91.8 grams, find the half-life of the material.

4. How long does it take an investment to double if it earns 4.68% annual interest...

   (a) (10 points) compounded semi-annually (twice per year)?

   (b) (10 points) compounded continuously?

5. (25 points) A street light is mounted at the top of a pole 15 ft tall. A man 6 ft tall walks away from the pole with speed of 5 ft/s along a straight path. How fast is the tip of his shadow moving when he is 40 ft from the pole?