Problem Set #9
Due: Thursday, 10 November 2011

1. For some positive constant C, the reaction R of the body, measured as a change in temperature, to a dose D of medicine, measured as the amount of medicine absorbed in the blood, is given by

$$R = \left(\frac{C}{2} - \frac{D}{3} \right) D^2 .$$

    (a) What dosage maximizes the reaction?

    (b) The sensitivity of the body to the drug is defined as $\frac{dR}{dD}$. What dosage maximizes the sensitivity?

2. What is the area of the largest triangle that can be formed in the first quadrant by the x-axis, the y-axis and a tangent line to the graph $y = e^{-x}$?

3. Let $a > 0$. Show that the maximum value of $f(x) := \dfrac{1}{1+|x|} + \dfrac{1}{1+|x-a|}$ is $\dfrac{2+a}{1+a}$.