Problem Set 1   **Calculus 2**   **Due 1/24/07**

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. Read the news article at
    http://news.yahoo.com/s/nm/20070116/sc_nm/biofuel_summit_transport_dc_2 .
    a) If ethanol production remained constant at 5 billion gallons per year, how much would be produced between the beginning of 2008 and the beginning of 2030?

    b) If instead production could immediately be elevated to the 60 billion gallon per year level mentioned in the article, and remain constant at that level, how much would be produced between the beginning of 2008 and the beginning of 2030?

    c) Suppose that production in fact increases linearly from 5 billion gallons per year at the beginning of 2008 to 60 billion gallons per year at the beginning of 2030. How much ethanol would be produced over that period in this case?

    d) Find a function of the form $f(x) = a x^2 + b x + c$ which produces 5 billion gallons per year when $x = 0$, 60 billion gallons per year when $x = 22$, and has $f'(0) = 0$. If production followed this pattern, what would the total ethanol production be over this period?

2. a) Do #44 in Stewart §6.1, using a **single** integral with respect to y.
    b) Generalize to the situation where the tangent line intersects $y = x^2$ at (a, a^2).

3. Do #49 in Stewart §6.2.

4. Do #50 in Stewart §6.2.