Problem Set 4   **Calculus 2**   **Due 10/28/05**

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. A logistic differential equation is one where the rate of change is proportional to both the current value and how far the current value is from some threshold. Examples of phenomena that can exhibit logistic growth include populations operating with limited resources, the spread of a disease, chemical reactions, and the spread of a rumor. Suppose that a hot rumor begins spreading across the Coe campus, with 3 people initially knowing the rumor at noon and 13 people having heard it by 1pm. If the rate at which the rumor spreads is proportional to both the number of people who've heard it and the number of people on campus who haven't heard it yet (use 1500 as the number of people on campus), use Euler's method with $\Delta t = 1$ to project the number of people who will have heard the rumor by 6pm.

2. Do problem #32 in §9.3.

3. Suppose that a 70° yam is placed in a 350° oven. After 10 minutes the yam has warmed up to 110°. Find a function giving the yam's temperature t minutes after it's placed in the oven.

4. Suppose that the yam from problem 3 is placed in an oven that has only just been turned on, so that at first the oven is at 80°, and the oven heats up linearly to 350° over the course of the next 15 minutes. Use Euler's method with $\Delta t = 5$ to approximate the yam's temperature after 20 minutes. Compare your answer to the one your solution to problem 3 predicts.