Problem Set 5   **Calculus 1**   **Due 12/12/11**

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 3 points for correct and clearly justified answers. An additional quality point will be awarded to submissions which are presented in a manner appropriate to good college-level work.

1. A ball is bouncing up and down. Each time the ball bounces, it rebounds with 60% of the velocity it had before impact. If the ball is initially thrown downward at 30 feet per second from a height of 20 feet, find how long it takes for the ball to peak for the second time.

2. a) A car is traveling 120 feet per second along the interstate, and suddenly hits its brakes to avoid hitting a baby rhinoceros. If the car decelerates by 20 feet per second each second until coming to a stop, how much distance does it travel before coming to a stop?

    b) If the car is traveling 10% faster when the brakes are first applied, how much (in feet and as a percentage) does this affect the stopping distance?

3. Example 3 in §6.1 is strangely unrealistic, in that it assumes the skydiver instantly reaches terminal velocity. Replace this assumption with a 0 m/s starting velocity, followed by (downward) acceleration of $8m/s^2$ for the first 10 seconds, then everything as described in that example. How much difference does it make?