CSE 200 Spring 2008, HW 11 – **due date: April 29, before 11am**. Please bring a **hardcopy** to Jolley Hall 506 (instructor's office) or leave a hardcopy in instructor's mailbox in Bryan Hall 509.

1. (10 points) finish online course evaluation (by the due date) – thank you.

2. In the last lecture of the course, we discussed designing a car safety bumper, which is also the sample problem 10-6 in the textbook. The final ODE we got was based on the information of F = K v^3 (x+1)^3, where K = 30 s-kg/m^5 is a constant and m = 1500 kg. We also know that v0 = 90 km/hour. We are interested in the speed (v) in terms of car position (x). We also discussed how to get the ODE for the problem and how to use ode45 – a build-in function – to get and plot v for 0<=x<=3. The final ODE is dv/dx = -K v^2 (x+1)^3/m. In lecture 12, we also discussed different ways to solve ODE. The main idea is simple – repeat the same simple steps over and over again. The principle we followed was based on the definition of derivative, which can also be viewed as a special case of Taylor's expansion. Now finish the following:

    a. (1 point) approximate the results using ode45 (see the textbook)
    b. (10 points) write a program using v(x+h) = v(x) + h * dv/dx. You need to submit your program.
    c. (10 points) plot the results form (a) and (b) using step sizes of 0.2 (both curves in one plot) and 0.02 (both curves in another plot).
    d. (0 point) compare the two curves to see which method is better.