18.06 **Problem Set 6**

due: Tuesday, 20 March 2001

1. (10pts.) From Strang's book, section 4.3, do problems 9. and 10. for the four points (1,0), (1.5,2), (2,3) and (3,3). In both, problems 9. and 10. also find the solution to the normal equations, using matlab if you like. Plot the four points and the graphs of the approximating parabola and cubic.

2. (5pts.) From Strang's book, section 4.3, do problem 12.

3. (15pts.) Automobile insurance companies take a special interest in the dependence of risk on the amount of driving. Based on Swedish data, the following simplified table gives the amount X of driving per year (in 1000km) and the accident frequency Y (in %).

x_v	5	10	15	20	25	30	40	50
y_v	9	10	14	18	22	24	29	29

   (a) Draw the points in a graph x_v versus y_v.

   (b) Use the least squares method to fit two lines to these data points: The first one may intersect the y-axis in an arbitrary point. The second one must pass through the origin (this seems reasonable — somebody who doesn't drive at all should never be involved in an accident with their car).

   (c) Draw the lines determined in part 3b in your graph from part 3a.

   (d) Determine the vector of errors, $\mathbf{e} = \mathbf{b} - \mathbf{p}$ for the two cases, and plot its x versus its y components. Also calculate the norm of $\mathbf{e}$ in both cases.

   (e) Do you think either one of these lines accurately represents the data?