1. (*Problem 2 and 3 of Recktenwald, Numerical methods with Matlab)* In the NMM toolbox there is a function file called `linefit`. In the data directory there is a dataset called `glycerin.dat`. It contains the density of glycerin vs temperature

   (a) Scatter plot `glycerin.dat` with Temperature on the x-axis.

   (b) Using `linefit` fit a line to the dataset.

   (c) Plot the line and the data on the same axes.

   (d) Do the (a)-(c) for `bearing.dat` This is a dataset on wear of a journal bearing as a function of operating temperature. From this data determine the limit on bearing temperature if the wear should not exceed 8 mg in 100 hours of operation.

2. (*Problem 6 of Recktenwald, Numerical methods with Matlab)* The `xyline.dat` file contains two columns of numbers (x and y) that are reasonably well fitted by a line. Write an m-file function to perform the following tasks:

   (a) Find the slope and intercept of the line and store it in a vector c. Computer the norm of the residual of the fit $r = \| y - Ac \|_2$

   (b) Create two vectors with values within $\overset{+}{-}$ 40% of the c_1 and c_2 obtained from the preceeding step; that is, create

   c1t = c(1)`linspace(0.6,1.4,20)`
   c2t = c(2)`linspace(0.6,1.4,20)`

   (c) Create a matrix R having elements equal to the norms of the residuals of the fits using all combinations of `c1t` and `c2t`; that is create

   $$R(i,j) = \| y - c1t(i)x - c2t(j) \|_2 .$$

   (d) Use the built in `meshc` and `contour` functions to create surface and contour plots with R on the z axis, c1t on the x and c2t on the y axis.

   (e) Explaing the data displayed in the surface and contour plots are consistent with the thoery of least squares.