**IEOR 4500, Project 1, due 9/24**

**1.** Implement the power method for estimating the spectrum (eigenvalues and eigenvectors) of a square matrix. Your code should have, as input, a matrix and also a tolerance: a positive number less than 1. Your code should terminate when the ratio between an eigenvalue and the top eigenvalue is smaller than the tolerance. Apply this code to the Russell matrix that was supplied with the data. You may use the code we wrote in class as a starting point.

**2.** Using a data set for asset prices that we will supply soon, (a) compute the covariance of returns matrix and (b) run the algorithm implemented for Part 1 above. This data set will have some missing entries: discuss how you handle this feature.

**3.** Extra credit #1. Let T be the number of days in the data set used for Part 2. Suppose you run the power method on each of the T-2 covariance matrices obtained by using the first two days of data, the first three days, the first four days, ..., the first T days. Discuss what happens to the spectra that you compute.

**4.** Extra credit #2. Implement the version of the power method where you simply raise the covariance matrix to a high enough power k, which is itself a power of 2. How fast does it go? Do you get the same answer as in part 2?