CS 383C/CAM 383C/M 383E **Homework 5** **Due: Dec. 2, 2002**

1. (Eigenvalues and Eigenvectors–50pts) Write a MATLAB subroutine [v, lambda] = `myeig`(A) that takes a real, symmetric matrix A as input and computes its eigenvalues and eigenvectors by the three step process:

(a) Reduce A to a symmetric tridiagonal matrix T using Householder reflections.

(b) Compute T's eigenvalues and eigenvectors using bisection and inverse iteration.

(c) Backtransform the eigenvectors of T to get eigenvectors of A.

Sumbit your MATLAB code. Clearly state your stopping criteria for (b) above. How do your answers compare with MATLAB's `eig` function? How many operations does your code require? What are your answers for the matrix:

$$T = \begin{bmatrix} 3\epsilon/4 & \epsilon/4 & 0 \\ \epsilon/4 & 7\epsilon/4 & \sqrt{\epsilon} \\ 0 & \sqrt{\epsilon} & 1 \end{bmatrix}.$$