MATH 280-01 (122)
MATLAB Assignment 4
Due May 13, 2013

The following MATLAB commands will be used in this assignment:

magic(N) is an N-by-N matrix constructed from the integers 1 through N^2 with equal row, column, and diagonal sums. Produces valid magic squares for all $N > 0$ except $N = 2$.

poly(A), when A is an N by N matrix, is a row vector with N+1 elements which are the coefficients of the characteristic polynomial

roots(C) computes the roots of the polynomial whose coefficients are the elements of the vector C. If C has N+1 components, the polynomial is $C(1) * X^N + ... + C(N) * X + C(N+1)$.

E = eig(A) is a vector containing the eigenvalues of a square matrix A.

[V,D] = eig(A) produces a diagonal matrix D of eigenvalues and a full matrix V whose columns are the corresponding eigenvectors so that $A * V = V * D$.

Q1. Are $n \times n$ magic squares nonsingular? compute the determinants of the magic squares matrices in the case $n = 3, 4, \ldots, 10$
What seems to be happening? Check the case $n = 24$ and 25 to see if the pattern still holds.

Q2. Let

$$A = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & -2 \\ 2 & -1 & -1 \end{bmatrix}$$

(a) Use MATLAB to compute the eigenvalues and eigenvectors of A

(b) Use MATLAB to find the characteristic polynomial of A and then find its roots

(c) compute $V * D * V^{-1}$