MA530. Homework 5

This part of the homework due October 18, 2006

Solve the following problems 1) analytically 2) using Mathematica

1. Let

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$$

$$B = \begin{pmatrix} -1 & 3 \\ 1 & 1 \end{pmatrix}$$

Calculate $\det(AB - BA)$

2. Find A^{-1} for the following matrix:

$$A = \begin{pmatrix} 1 & 3 & 3 \\ 3 & 8 & 7 \\ 2 & 7 & 9 \end{pmatrix}$$

3. Solve

$$\begin{pmatrix} 1 & 3 & 2 \\ 3 & 8 & 5 \\ 2 & 7 & 6 \end{pmatrix} X = \begin{pmatrix} 1 & 0 \\ 3 & 1 \\ 3 & -4 \end{pmatrix}$$

4. (#9 p.343) Given the following real matrix A:

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

   (a) Find the eigenvalues of A.

   (b) Find an eigenvector corresponding to each eigenvalue

(c) Sketch the Gerschgorin circles and (approximately) locate the eigenvalues as points in the plane.

5. (#1 p. 353) Produce a matrix that diagonalizes the given matrix A or show that this matrix is not diagonalizable.

$$A = \begin{pmatrix} 0 & -1 \\ 4 & 3 \end{pmatrix}$$

6. (#7 p. 367) Find the standard form of the following quadratic form:

$$-5x_1^2 + 4x_1x_2 + 3x_2^2$$