Ma 227   Exam I   2/19/03

Name: _____   **ID**: _____

Lecture Section: _____   **Recitation Section**:_____

I pledge my honor that I have abided by the Stevens Honor System.   _____

SHOW ALL WORK! You may not use a calculator on this exam.

1 $\left[\, 20\ \textbf{pts}. \,\right]$ Does the system

$$x_1 + x_2 = c_1$$
$$x_1 - x_2 = c_2$$
$$-x_1 + 2x_2 = c_3$$

possess a solution for all c_1, c_2, c_3? Explain your conclusion.

2 Let

$$A = \begin{bmatrix} -4 & 2 \\ -3 & 1 \end{bmatrix}$$

2a [**20 pts**.]   Find all eigenvalues and eigenvectors of the matrix A.

.

2b [20 pts.]   Solve the initial value problem

$$x'(t) = Ax(t), \quad x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

where A is the matrix above in part 2a.

3 a [20 pts.]   Let

$$A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$$

Find A^{-1} using elementary row operations.

3 b [20 pts.]   Let

$$B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

Find a 2×2 matrix X such that

$$AX = B$$

and a 2×2 matrix Y such that

$$YA = B$$