Ma 227 **Exam I** **10/11/06**

Name: _____

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

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

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You may not use a calculator, **cell phone**, **or computer while taking this exam**. **All work must be shown to obtain full credit**. **Credit will not be given for work not reasonably supported**. **When you finish**, **be sure to sign the pledge**.

Score on Problem #1a _____

#1b _____

#2a _____

#2b _____

#2c _____

Total Score _____

1a [20 **pts**.] Let

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

Find A^{-1}. Be sure to show all the steps in your calculation and indicate what you are doing in each step.

1b [20 **pts**.] Find the solution to the system

$$x_1 + 4x_2 = c_1$$
$$2x_1 + 3x_2 = c_2$$

2 Let

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

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

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2b [**20 pts**.] Find a general homogeneous solution of

$$\frac{dx_1}{dt} = x_1 + 4x_2$$
$$\frac{dx_2}{dt} = 2x_1 + 3x_2$$

2*c* [20 **pts**.] Find a particular solution of

$$\frac{dx_1}{dt} = x_1 + 4x_2 - e^t$$
$$\frac{dx_2}{dt} = 2x_1 + 3x_2 + e^{2t}$$

Hint: Let

$$X_p = \begin{bmatrix} ae^t + be^{2t} \\ ce^t + de^{2t} \end{bmatrix}$$