Ma 227   **Exam IA**   **2/27/06**

Name: _____

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

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

_____

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 #1 _____

#2 _____

#3 _____

Total Score   _____

1 $\left[\,20\ \textbf{pts.}\,\right]$ Let

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

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

2 Let

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

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

$$\frac{dx_1}{dt} = x_1 + x_2 \qquad\qquad x_1(0) = 2$$

$$\frac{dx_2}{dt} = 4x_1 - 2x_2 \qquad\qquad x_2(0) = 1$$

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

$$\frac{dx_1}{dt} = x_1 + x_2 - e^{-t}$$

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

3 [20 **pts**.]   Under what condition or conditions on c_1, c_2, c_3 will the system below have a solution? You need only give the condition. You need not solve the system.

$$x_1 + 2x_2 + x_3 + 3x_4 = c_1$$
$$3x_1 + 6x_2 + 5x_3 + 10x_4 = c_2$$
$$5x_1 + 10x_2 + 7x_3 + 16x_4 = c_3$$