

Ma 227

Exam IB

3/3/04

Name: _____

ID: _____

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 [20 pts.] Let

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

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

2 Let

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

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

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

$$x'(t) = Ax(t)$$

where A is the matrix above in part 2a.

2c [20 pts.] Find a general solution of $x'(t) = Ax(t) + \begin{bmatrix} e^{-3t} \\ -e^{-3t} \end{bmatrix}$

where A is the matrix above in part 2a.

3 [20 pts.] Rewrite the scalar equation

$$y'' - ty' + 10y = \cos t$$

as a first-order system in normal form.