

NAME: _____

AM 034

Brown University
Homework, Set 1

Fall 2004
Due September 24, 2004

1.1 Find the solution to the system

$$x' = 4x - 3y \quad y' = 6x - 7y, \quad (1)$$

that satisfy $x(0) = 2$ and $y(0) = -1$. (**Hint:** Use substitution, not matrices.)

1.2 # 17, §7.1 in B & D

1.3 If linear, write the following in matrix form:

(a)

$$x'_3 = -2x_2 + x_3 - x_1 + \sin(t) \quad (2)$$

$$x'_2 = 2x_3 - 5x_1 - x'_2 + e^{-t} \quad (3)$$

$$x'_1 = x_1 - 2x_3 + x_2 \quad (4)$$

(b)

$$x'_2 = x_1 + x_3 - 2x_2 + 1 \quad (5)$$

$$x'_1 = x_2 + x_1x_3 \quad (6)$$

$$x'_3 = x_3 + 2x_1 - x_2 \quad (7)$$

1.4 Compute the inverse (or show it is singular) of $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$.

1.5 Find A^T , \bar{A} , and A^* for $A = \begin{bmatrix} 4i & 3 \\ -2i & 2 \end{bmatrix}$.

1.6 Find A^{-1} of $A = \begin{bmatrix} 6 & 9 \\ -4 & 6 \end{bmatrix}$, if possible.

1.7 What is the **det** of $A = \begin{bmatrix} 3 & 5 & 7 & 2 \\ 2 & 4 & 1 & 1 \\ -2 & 0 & 0 & 0 \\ 1 & 1 & 3 & 4 \end{bmatrix}$

1.8 Find the eigenvalues and eigenvectors of

(a) $A = \begin{bmatrix} 6 & -7 \\ 1 & -2 \end{bmatrix}$

(b) $B = \begin{bmatrix} 5 & -6 & -6 \\ -1 & 4 & 2 \\ 3 & -6 & -4 \end{bmatrix}$

1.9 Why is A^2 invertible whenever A is invertible?