

Name: _____

Math 214 { Linear Systems
Spring Term 2000

Lab 1

Directions: The worksheet is to be written on neatly while you explore MATLAB.

Due Date: Monday, 14 Feb, in class.

Information concerning MATLAB: MATLAB is accessible in the Mathematics folder on computers in Fowler (127, 112, and 111). It is not available in the Library, unfortunately, due to site license issues.

To open MATLAB, open the Mathematics folder by clicking on it with the mouse. A window with various mathematics packages opens up. Click on the MATLAB icon in that window, and you're ready to go.

I. Examples of Matrix Operations

1. Referring to the accompanying handout on matrices in Matlab, enter the necessary statements to create the following matrices in Matlab.

$$A = \begin{matrix} & \mathbf{2} & & & \mathbf{3} \\ & 1 & 4 & 6 & \\ \mathbf{4} & \mathbf{i} & 2 & 3 & \mathbf{5} \\ & 1 & 0 & 4 & \end{matrix} \quad B = \begin{matrix} & \mathbf{2} & & \mathbf{3} \\ & 2 & \mathbf{i} & 3 & 5 \\ \mathbf{4} & \mathbf{1} & 0 & \mathbf{6} \\ & 2 & 3 & 1 & \mathbf{5} \end{matrix} \quad C = \begin{matrix} & \mathbf{2} & & & \mathbf{3} \\ & 5 & 1 & 9 & 0 \\ \mathbf{4} & \mathbf{4} & 0 & 6 & \mathbf{i} & \mathbf{2} \\ & 3 & \mathbf{i} & 1 & 2 & 4 & \mathbf{5} \end{matrix} \quad D = \begin{matrix} & \mathbf{2} & & & \mathbf{3} \\ & 3 & 2 & 5 & \\ \mathbf{6} & \mathbf{4} & 1 & \mathbf{3} \\ \mathbf{4} & \mathbf{0} & 2 & \mathbf{1} \\ & \mathbf{i} & 2 & 5 & 6 & \mathbf{7} \end{matrix}$$

2. Compute the following using Matlab. Write down the result returned by Matlab. Pay attention to how the operations were performed by Matlab and note any unexpected results along the way. If you receive an error message, write it down here; you will use it later in the final section.

Expression

Result or Error Message

a. $A + B$

b. $2*B$

c. $A - 2*B$

d. $\text{eye}(3)$

e. $A - 2 \cdot \text{eye}(3)$

f. $A.^2$

g. A^2

h. $A.*B$

i. $A*B$

j. $A + C$

k. $C*D$

l. $D*C$

m. A'

n. D'

m. B'

II. Some Handy Matlab Commands

1. Your most recent result in Matlab is stored in the variable `ans`. Enter `ans` to see your most recent result and write down what is returned.

2. To determine what the existing variables are, type in the command `who`. Write down what is returned.

III. Manipulating Matrices

1. Enter the following commands, and then explain what they do. (If you do not see what a command is doing, experiment by changing a number or two to see what effect this has.)

a. `A(1,:)`

b. `A(:,1)`

c. `A(2,3)`

d. `A(1:3,1:2)`

e. `E = [A B]`

f. $F = A(1,:)$

g. $E(2,:) = [1\ 0\ 0\ 0\ 0\ 0]$

h. $A([1\ 2],:) = A([2\ 1],:)$

i. $G = 0:1:10$

j. $G = 1:0.1:2$

IV. More Examples of Matrix Operations

1. Enter the following commands and then write down the result or error message of each statement. Again, pay attention to how the operations were performed by Matlab and note any unexpected results along the way.

Expression

Result or Error Message

a. $V = [1\ 3\ 1]$

b. $A = 2*\text{eye}(3)$

c. $B = \text{diag}(V,0)$

d. $C = A - B - B'$

e. $\text{sqrt}(A)$

f. $W = [-1; 2; 0]$

g. $V*W$

h. $W*V$

i. W'

j. $V*W'$