

For this assignment, you can paste your MATLAB command window output into a Word document as before. Augment your MATLAB output to clearly indicate where one problem begins and the next one begins. For the written parts, you can type these in also or write them by hand.

- 1) (2 pts) Define the following variables:

$$a = 1 + 2i; \quad b = -1 + 2i.$$

Perform the following computations in MATLAB and verify the results by hand.

- a) a^2
 b) $a*b$
- 2) (3 pts) Give the command that will create a row vector from -1 to 1 in steps of 0.1 and store it in the variable x . What are the dimensions of x (hint: use the `size` command)? Give the output from the following commands and explain the results. If you encounter an error, explain why the error occurs.

- a) `x(1:11)`
 b) `x(0:22)`
 c) `x(1:2:21)`
 d) `x(21:-1:10)`
 e) `x(1:.1:2)`

Is the last command safe to use?

- 3) (4 pts) Create the matrix

$$A = \begin{pmatrix} 2 & 4 & 6 \\ 3 & 6 & 9 \\ 4 & 8 & 12 \end{pmatrix}.$$

Give the output of each command and explain the results. If you encounter an error, explain why the error occurs.

- a) `A(:,2)`
 b) `A(:,1:2:3)`
 c) `A(1,:)`
 d) `A(1:2,2:3)`
 e) `A'`

Define `ii = [3 1]` and `jj = [3 2]`. Explain the output of

- f) `A(:,jj)`
 g) `A(ii,:)`
 h) `A(ii,jj)`

- 4) (2 pts) Give the commands that will create the following quantities:

$$D = \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}; \quad e = (6 \ 9); \quad f = \begin{pmatrix} 4 \\ 8 \\ 12 \end{pmatrix}.$$

Now give the command that will use D , e and f to build the matrix A from Problem 4).

- 5) (6 pts) Create the following vectors in MATLAB:

$$w = \begin{pmatrix} 4 \\ 2 \\ 1 \end{pmatrix}; \quad x = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}; \quad y = \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}; \quad z = \begin{pmatrix} i \\ -i \\ 3i \end{pmatrix}.$$

Can the following operations be performed? If yes, give the result and verify by hand computation. If not, completely explain why not.

- a) `x * w`
- b) `w' * w`
- c) `y' * z`
- d) `y .* w`
- e) `x ./ y`

6) (2 pts) Let y be defined as in Problem 5). Perform the following calculations and verify the results by hand:

- a) `t = y.^3`
- b) `r = sqrt(y.*y)`
- c) `s = norm(y)`

7) (4 pts) Let D be defined as in Problem 4). Perform the following calculations and verify by hand.

- a) `C1 = D^2`
- b) `C2 = D.^2`

Clearly explain the difference in these 2 calculations.

8) (2 pts) Suppose x is a column vector of length 100. Write a single MATLAB comand that will produce the vector

$$y = \begin{pmatrix} x(1) + x(2) \\ x(3) + x(4) \\ \vdots \\ x(99) + x(100) \end{pmatrix}$$