**Week 03: Due Date: Tuesday 30, 2024. Time 10 AM**

When you have completed the exercise, submit your responses (MS Word or PDF file) on Canvas. If you have any questions, ask your Teaching Assistants immediately! They are in the lab to help you learn the material.

**Challenge-1 Built-in functions**

MATLAB provides numerous built-in variables and functions. For each line below, type the text in the Command Window and press <Enter> to see what happens. Is the result what you expect? Fill in the blanks below with the screen output for that line.

*% Variables, constants, and simple calculations:*

a= 250 *% Look at the Workspace Pane: a VARIABLE called a has been created*

a= 901 *% Look at the variable’s value in the Workspace Pane*

b= 89

a**/**b *%10.1236 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

ans

y= ans *%10.1236 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

x = 2;

y = x^x; z = y^y *% 256\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*% Built-in functions:*

sqrt(x) 1.4142

pi *% a built-in variable*

cos(pi) *% -1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

abs(ans)

abs(cos(pi)) *%1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

exp(ans) 2.7183

mod(7,2) *% \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Function rem is similar*

help mod *% quick function reference*

help rem

doc rem *% detailed function documentation*

b= (4**\***2) *...*

**+** 1 *% What does ... do? \_9\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*% It’s called the ellipsis*

**Challenge-2 for-loop**

A for-loop repeats the loop body—the statements between the loop header and the end keyword—a pre-determined number of times. (The loop header is the line that begins with the keyword for). What does each loop below do? Write in each blank the output from executing the loop above.

**for** a = 2:1:6

disp(a) *% 2*

*3*

*4*

*5*

*6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**end**

**for** b = 2:6

disp(b) *%2*

*3*

*4*

*5*

*6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**end**

**for** c = 12:0.5:14

disp(c) *%12.0*

*12.5*

*13.0*

*13.5*

*14.0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**end**

**for** d = 0:**-**2:**-**6

disp(d) *%0*

*-2*

*-4*

*-6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**end**

**for** f = 0:**-**2:**-**7

disp(f) *% 0*

*-2*

*-4*

*-6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**end**

**for** g = 5:2:1

disp(g) *% How many times does the loop body execute? \_\_\_\_\_\_\_\_*

**end** *% Any error message? \_\_\_\_\_\_\_\_*

**Challenge-3 Vectors**

a= zeros(1,3) *%0 0 0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

b= ones(3,1) *%1*

*1*

*1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What do the arguments specify?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

c= rand(1,4) *%0.8174 0.9058 0.1270 0.9134\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

d= 10:2:17 *%10 12 14 16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

f= 10:**-**1:7 *%10 9 8 7\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

g= 10:2:0 *%\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

h= [10 20 40] *%10 20 40\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What does the space separator do?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

m= [10,20,40] *%10 20 40\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What does the comma separator do?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

n= [10;20;40] *%10*

*20*

*40\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What does the semi-colon separator do?\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

p= [a h] *%0 0 0 10 20 40\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

q= [b; n] *%1*

*1*

*1*

*10*

*20*

*40\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

r= [a n] *% ERROR--mismatched dimensions! (Attempt to concatenate a column to*

*% a row)*

s= b**'** *%1 1 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ This operation is called "transpose"*

t= [a b**'**] *%0 0 0 1 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

u= sum(t) *%3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What does function sum do?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**Challenge-4 Determinant of a 3x3 matrix**

Write MATLAB code, where x is a 3x3 matrix. Use the following formula:

A black and white image of a mathematical equation

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**Use the built-in function** det() to find the determinant of each 2×2 matrix. For example, det(m) returns the determinant of 2×2 matrix m. Then use the formula given above to calculate the determinant of a 3×3 matrix. This question is all about practicing how to access individual components or submatrices in a matrix. Recall that you can construct a matrix by putting two row vectors one below the other or putting two column vectors side by side.

**Marks (Total 100) – Challenge-1 14, Challenge-2 14, CA screenshot of a computer

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