Abbes Laghrour University of Khenchela **Faculty of Sciences and Technology**
Department of Mathematic & Computer Science **1st year Level**

FINAL EXAM (Standard correction)
PROGRAMMING TOOLS FOR MATHEMATICS

Duration : 1h 30 ***23Mai 2024***

Full name: . . . . . **Domain/Group:**	Mark /20

Exercise 01: (05pts)

Give briefly the signification of each of the following expressions:

1	**Workspace**	The window that indicates in detail all the variables used (name, size, …etc) **(0.75)**
2	**Format rat**	The command that allow to display the numbers on a rational form **(0.75)**
3	**.**	The element by element reverse division operation. **(0.75)**
4	**Subplot**	Allow to divide the window on several rows and columns and to display several figures (curves) **(0.75)**
5	**Mode interactif**	It's an operating mode used on the command window in which the execution is done line by line **(01)**
6	**Hold on**	Allow to display several curves on the same figure **(01)**

Exercise 2: (05 pts)

Let be the following matrix: $B=\begin{bmatrix}128 & 64 & 32 & 16 & 8 & 4\\ -1 & 1 & 3 & 5 & 7 & 9\\ 6 & 5 & 4 & 3 & 2 & 1\end{bmatrix}$

Question	Answer
1. Create with one instruction the matrix B :	$B = [2.\hat{}(7:-1:2)\ ;\ -1:2:9; 6:-1:1]$ **(01)**
2. Display the first two columns of B.	***B(:, 1 :2)*** **(01)**
3. Exchange the elements of the first row with the last row :	***B([1 3], :) = B([3 1], :)*** or **(01)** ***X=B(1, :) ; B(1, :)= B(3, :) ; B(3, :)= X***
4. create a matrix A where the order of the columns is reversed as shown below: $A=\begin{bmatrix}4 & 8 & 16 & 32 & 64 & 128\\ 9 & 7 & 5 & 3 & 1 & -1\\ 1 & 2 & 3 & 4 & 5 & 6\end{bmatrix}$	***A= B(:, end:-1:1)*** **(01)**
5. Add the vector V= [6 5 4 3 2 1] as a row to the matrix **A**	***V=[6 5 4 3 2 1] ; A(4, :)=V*** **(01)**

Exercise 3: (06 pts)

Give the value of **x** after the execution of each of the following codes:

Code	x=ones(3,3) ;
	y=tril(x) ;
	while(sum(sum(x-y))~=12)
	x=x.^2+1 ;
	end ;
		x= [0 :5] ; y=x([1 2 3 4 5 6]) ;
		if (x-y)==(y-x)
		x=y([6 5 4 3 2 1]) ;
		else x =y
		end
			x=ones(3,2) ;
			For
			i= 1:length(x(1, :))
			x=x(1, :)*2 ;
			end ;
				function x = ps2(U,V)
				n = size(U,2);
				x = 0. ;
				for i = 1:n,
				x = x + U(i) * V(i);
				end

Value of X	X= 2 2 2 2 2 2 (01.5) 2 2 2	X= 5 4 3 2 1 (01.5)	X= 4 4 (01.5)	Error (we don't have the values of U and V) (01.5)

PS: The function **tril** returns the lower triangular part.

Exercise 4 : (04 pts)

1- Let be the three following functions

F1(x)=$x \sin(1/x)$ **F2(x)**= x^3 **F3(x)**= $x^2 + 3x + 5$

- Write a Matlab script that allows you to plot on the same figure the curves of the functions F1, F2 and F3 with different colors on the interval [-1 1]. With the title **'Comparative study of curves'**
- **G**ive the figure a legend and a grid

X=[-1 1];…… (0.25pts)

F1=X.*sin(1/X) ; ….. (0.25pts)

F2=X.^3 ; ……..(0.25pts)

F3=X.^2+3.*X+5 ; …..(0.25pts)

Plot(X, F1, 'b-') ;……. (0.5pts)

Hold on ;……..... (0.5pts)

Plot(X, F2, 'g :');…… (0.5pts)

Plot(X, F3, 'r--');……..(0.5pts)

Title ('Comparative study of curves'); …….(0.25pts)

Grid on;……..... (0.5pts)

Legend('F1','F2', 'F3');…… (0.25pts)

<u>Bonus Question</u> : (01 points)

Let be the matrix **D** defined by: $D = \begin{matrix} 1.0000 & 1.0000 & 0.8491 & 0.6787 \\ 1.0000 & 1.0000 & 0.9340 & 0.7577 \\ 1.0000 & 0 & 1.0000 & 0 \\ 0 & 1.0000 & 0 & 2.0000 \end{matrix}$

1- Express **D** with a single statement in terms of ***eye***, ***ones***, ***zeros, rand*** and ***diag***

D= [ones(2), rand(2,2) ; eye(2), diag([1 2])] …….. (01)

Good Luck