**Series 2(Correction)- Vectors in MATLAB Objective**: The objective of this practical work is to learn how to: define, manipulate and operate on vectors in MATLAB.

**Exercise 1:**

1. Let k be a vector defined from 3 to 5 with a step of 2, N a vector defined from 1 to 2 with a step of 1 and the vector F which is the horizontal concatenation of k and N. Define the vectors K, N and F in MATLAB and display the results obtained;

 >> k=[3:2:5]

k =

3 5

>> N=[1:2]

N =

1 2

>> F=[k,N]

F =

3 5 1 2

2. Define the following vectors t (row-vector) and v (column-vector):

 1st definition method:

>> t=[0 3 6 9 12 15 18]

t =

0 3 6 9 12 15 18

2nd definition method:

>> t=0:3:18

t =

0 3 6 9 12 15 18

3rd definition method:

>> t=linspace(0,18,7)

t =

0 3 6 9 12 15 18

>> v=[1;3;7;9;5]

v =

1

3

7

9

5

Modify the values of the elements in the indices: 5 and 7 by the value -3 of the vector t.

𝑡 = (0 3 6 9−3 15−3);

 >> t([5,7])=-3

t = 0 3 6 9 -3 15 -3

3. Modify the values of the elements in the indices: 1 to 3 by the values 3, 5 and 9 respectively, then the elements of indices 4 and 5 by 8 and 10 of the vector v;

 >> v(1:3)=[3;5;9]

v =

3

5

9

9

5

>> v(4:5)=[8;10]

v =

3

5

9

8

10

4. Let 𝑣1 =(1 2 3 4), 𝑣2 =(7 6 0) be two row vectors. Create a row-vector v3 of size 10 by concatenating vector v1 of size 4 then two vectors of size 3 which correspond to vector v2;

𝑣3=(1 2 3 4 7 6 0 7 6 0)

 >> v1=[1 2 3 4]

v1 =

1 2 3 4

>> v2 =[7 6 0]

v2 =

7 6 0

>> v3=[v1 v2 v2]

v3 =

1 2 3 4 7 6 0 7 6 0

5. Let x and y be column vectors:

Define z which is a concatenation of x and y:



>> x=[3;5;6]

x =

3

5

6

>> y=[9;6]

y =

9

6

>> z=[x;y]

z =

3

5

6

9

6

- Insert the value 2 in the first position of the vector z,

the value 20 in the last position of the vector and the value -7 in the 3rd position of z;

>> z=[2;z;20]

z =

**2**

3

5

6

9

6

**20**

>> z(3)=-7

z =

2

3

-7

6

9

6

20

- Delete the elements in positions 2 and 4;

>> z([2,4])=[]

z =

2

-7

9

6

20

- Order the elements of vector z in ascending order;

>> sort(z)

ans =

-7

2

6

9

20

**Exercise 2:**

1. Construct the following vectors in MATLAB:

 𝑢1=(3 6 9…27 30)

 𝑢2=(−𝜋/2 –𝜋/4 0 𝜋/4 𝜋/2 …11𝜋/4 3𝜋)

 𝑢3=(0 1 49…81 100)

1. u1

>> 3:3:30 **%**1st definition method

ans =

3 6 9 12 15 18 21 24 27 30

>> 3\*[1:10] **%**2nd definition method

ans =

3 6 9 12 15 18 21 24 27 30

>> linspace(3,30,10) **%**3rd definition method

ans =

3 6 9 12 15 18 21 24 27 30

2. u2

>> -pi/2:pi/4:3\*pi **%**1st definition method

ans =

Columns 1 through 14

-1.5708 -0.7854 0 0.7854 1.5708 2.3562 3.1416 3.9270 4.7124 5.4978 6.2832 7.0686 7.8540 8.6394

Column 15 9.4248

>> pi/4\*[-2:12] **%**2nd definition method

ans =

Columns 1 through 14

-1.5708 -0.7854 0 0.7854 1.5708 2.3562 3.1416 3.9270 4.7124 5.4978 6.2832 7.0686 7.8540 8.6394

Column 15

9.4248

>> linspace(-pi/2,3\*pi,15) **%** 3rd definition method

ans =

Columns 1 through 14

-1.5708 -0.7854 0 0.7854 1.5708 2.3562 3.1416 3.9270 4.7124 5.4978 6.2832 7.0686 7.8540 8.6394

Column 15

9.4248

3. u3

>> u3 = [0:10].^2

u3 =

0 1 4 9 16 25 36 49 64 81 100

**Exercise 3:**

 1. Propose the MATLAB instructions which allow you to define the following three vectors:

 𝑣1=(1 2 3 4 5 6 7 8 9 10), 𝑣2=(−1.5,0,1.5,…,4.5,6), 𝑣3=(1,1/4,1/9,1/16,1/25,…,1/81,1/100)

>> v1 = [2:10]

v1 =

2 3 4 5 6 7 8 9 10

>> **V2** = [-1.5:1.5:6]

V2 =

-1.5000 0 1.5000 3.0000 4.5000 6.0000

>> V3 = (1./[1:10]).^2

V3 =

1.0000 0.2500 0.1111 0.0625 0.0400 0.0278 0.0204 0.0156 0.0123 0.0100

2. Create a vector v which contains all the elements of v1, v2, v3 consecutively;

>> V = [v1,V2,V3]

V =

Columns 1 through 14

2.0000 3.0000 4.0000 5.0000 6.0000 7.0000 8.0000 9.0000 10.0000 -1.5000 0 1.5000 3.0000 4.5000

Columns 15 through 25

6.0000 1.0000 0.2500 0.1111 0.0625 0.0400 0.0278 0.0204 0.0156 0.0123 0.0100

 3. Show the elements of v from the 11th position to the 5th position;

>> V(11:-1:5)

ans = 0 -1.5000 10.0000 9.0000 8.0000 7.0000 6.0000

# Exercise 4:

# Let the row vector be 𝑣=(-1 12 0 15 23 50 1 8).

# 1. Calculate and display the sum, average, product of the elements of v;

# 2. Calculate and display the minimum and maximum in v;

# 3. Reverse the vector v (display the elements of the vector in reverse order);

# 4. Find and display values greater than 10 in v.

>> v=[-1 12 0 15 23 50 1 8]

v =

-1 12 0 15 23 50 1 8

>> sum(v)

ans =

108

>> prod(v)

ans =

0

>> mean(v)

ans =

13.5000

>> min(v)

ans =

-1

>> max(v)

ans =

50

>> fliplr(v)

ans =

8 1 50 23 15 0 12 -1

>> v

v =

-1 12 0 15 23 50 1 8

**%%**1st definition method

>> >> x=find(v>10)

x =

2 4 5 6

**>> v(x)**

ans =

12 15 23 50

**%%**2nd definition method

**>> v(v>10)**

ans =

12 15 23 50