

## 7-2 Extracting bits of a vector:

مستخرج  
من المتجه

It can be extract any number or bits of numbers  
from the vector as follow:

Ex:

```
>> F1=[1:3,-3:1]
```

F1 =

```
1 2 3 -3 -2 -1 0 1
```

```
>> F2=F1(2:5)
```

F2 =

```
2 3 -3 -2
```

## Mathematical operation for vectors:

العمليات الرياضية

The result between two vectors may be equal to number or equal to new vector:

### 1. Plus and minus:

Note: the two vectors must be:

1. Equal in number of elements.
2. The same type ( row or column vector).

EX:

```
>> a=[1 2 3];
```

```
>> b=[2 ;4 ;5];
```

```
>> c=a+b
```

```
??? Error using ==> plus
```

Matrix dimensions must agree.

## 2. Multiplication operation:

It is divided into ~~two~~ types:

### a. Cross product: $(*)$

It is occurred between two different vectors ( row and column ) and there are some conditions must be implemented so as to get the result as follow:

1. ~~The first vector must be~~ <sup>if  $i_2$</sup>  row vector and the second ~~must be~~ <sup>is</sup> column vector ~~so as to get a~~ <sup>the</sup> result ~~equal to~~ <sup>will be</sup> number. ( the number of elements must be equal to each other )

2. If the first vector is column vector and the second is row vector the final result ~~must be~~ <sup>will</sup> be equal to matrix. ( the number of elements is not important ~~to each other~~ )

*may be equal or not*

EX:

a=[a1 a2 a3];

b=[b1 ; b2 ; b3];

c= a\*b

c= (a1\*b1)+(a2\*b2)+(a3\*b3)

EX:

>> a=[1 2 3];

>> b=[ 2;4;6];

>> c=a\*b

c=28

EX:

>> a=[1 2 3];

>> b=[ 2 4 6];

>> c=a\*b

??? Error using ==> mtimes



EX:  $\begin{bmatrix} 2 & 0 & 1 & 2 & 3 \\ 4 & 0 & 0 & 0 & 0 \\ 6 & 0 & 0 & 0 & 0 \end{bmatrix}$

>> c=b\*a

C =

2 4 6

4 8 12

6 12 18

EX:

>> b=[ 2;4;6;3];

>> c=b\*a

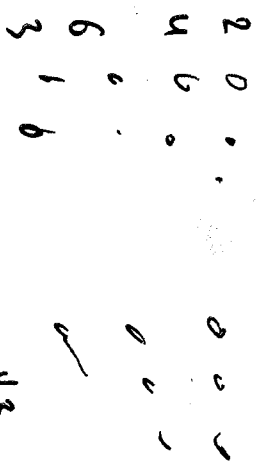
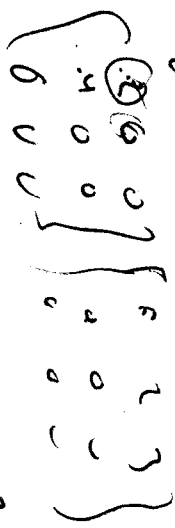
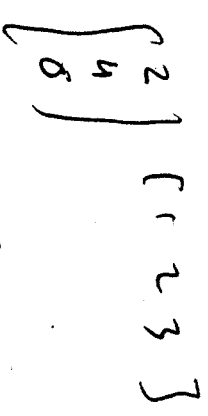
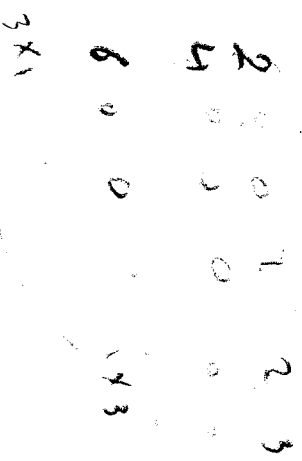
C =

2 4 6

4 8 12

6 12 18

3 6 9



$u \times v$

## b. Dot product (.):

It is <sup>occured</sup> concurred between two similar vectors ( row with row and column with column) and the number of the elements must be equal to each other vector ( the same length).

EX:

a.\*b=[a1 x b1, a2 xb2, .....an x bn]

مثلا 2\*3=6

EX:

>> a=[1 2 3];

>> b=[2 4 6];

>> c=a.\*b

c =

2 8 18

```
Ex:
>> a=[1 2 3];
>> b=[2; 4; 6];
>> c=a./b
??? Error using
```

```
Ex:
>> w=1:4
w =
    1    2    3    4
>> z=linspace(2,8,4)
z =
    2    4    6    8
>> d=w./z
d =
    0.5    0.5    0.5    0.5
```

$$\frac{8-2}{4-1} = \frac{6}{3} = 2$$

```
Ex:
>> a=0:0.5:2
a =
    0    0.5    1    1.5    2
>> b=1:5
b =
    1    2    3    4    5
c=a.\b
```

```
c =
    Inf    4    3    2.6667    2.5
```

```
Ex:
>> a=[1 0 4];
>> b=[2 0 3];
>> c=a./b
```

```
c =
    0.5    NaN    1.3333
```

Ex:

>> c=a\*b.

??? c=a\*b.

|

Error: Expression or statement is incomplete or incorrect.

Ex:

>> c=b.\*a

c =

2 8 18

### 3. Division operation ( / , \ ):

It must be occurred between two vectors similar to each other ( row with row and column with column).

EX:

$a = [a_1 \ a_2 \ a_3]; \ b = [b_1 \ b_2 \ b_3];$

$c = a ./ b = [a_1/b_1 \ , \ a_2/b_2 \ , \ a_3/b_3]$

$C = a.\backslash b = b./a = [b_1/a_1 \ , \ b_2/a_2 \ , \ b_3/a_3]$

EX:

>> a=[1 2 3];

>> b=[2 4 6];

>> c=a./b

c =

0.5 0.5 0.5

>> c=b./a

c =

2 2 2



## 3. Scale to power ( $\wedge$ ):

It's mean each element of the vector will be multiply by the value of the power:

```
a=[a1 a2 a3]
```

```
b=a.^2 = [a1^2 , a2^2 , a3^2]
```

Ex:

```
>> a=[1 0 4];
```

```
>> b=a.^3
```

b =

```
1 0 64
```

Also it can be make the vector as the value of the power as follow:

Ex:

```
>> v=[1 2 3]
```

```
>> h=2.^v
```

h =

```
2 4 8
```

Ex:

>> z=v'

z =

1

2

3

>> h=2.^z

h =

2

4

8

Ex:

>> h=2.^z

??? Error using

# Matrices

المجموعة الرابعة

It is include rows (m) and columns (n) and it can be represented it by a table.

1. Build the matrix:

It can be represent any matrix by using comma and semi colon as follow:

```
>> A=[3 , 5 , 8 ; 9 4 2]
```

```
A =
```

```
3 5 8
9 4 2
```

```
>> b=[ 1 2 ;4 5];c=[ 8 6];
```

```
>> d=[b ; c]
```

```
d =
```

```
1 2
4 5
8 6
```

2. Shows an element or elements from the matrix:

```
>> A=[3 , 5 , 8 ; 9 4 2]
```

```
A =
```

```
3 5 8
9 4 2
```

Row

Column

```
>> A(1,2)
```

```
ans = 5
```

اي مزه الكنافة

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~~~~~

Special matrices

اي مزه الكنافة = الموز

اي مزه الكنافة لقياسه

zeros

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اي مزه الكنافة

zeros (3)

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(3x3)

ans =  
0 0 0  
0 0 0  
0 0 0