Lecture 8 :-

* Algebraic operations on matrices by the usual and pointwise method in matlab:

العمليات الجبرية على المصفوفات بالطريقة الاعتيادية والنقطية في برنامج matlab

If you have

$$A = \begin{bmatrix} 9 & 2 \\ 5 & 1 \end{bmatrix} ; B = \begin{bmatrix} 1 & 4 \\ 6 & 3 \end{bmatrix}$$

* add (usual method)

```
>> A = [9 2 ; 5 1] ; B = [1 4 ; 6 3]↵
>> A+B ↵
ans =
    10   6
    11   4
```

* subtract (usual method)

```
>> A-B ↵
ans :
     8   -2
    -1   -2
```

* multiplication (usual method)

```
>> A*B ↵
```

in case $A_{m \times n} \cdot B_{n \times p}$ (n = n)

```
ans =
    21   42
    N    23
```

(pointwise method)

```
>> A.*B ↵
```

in case m=n or m≠n

```
ans =
     9   8
    30   3
```

* Division : (only the pointwise case)

for example

$$A = \begin{bmatrix} 9 & 2 \\ 5 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 4 \\ 6 & 3 \end{bmatrix}$$

Find division

>> A = [matrix writing] ; B = [matrix writing] ;↵

>> A./B ↵

ans :

9 0.5

0.83 0.33

* Raise the matrix : (1)

For Example (pointwise method)

$$A = \begin{bmatrix} 6 & 3 \\ 7 & -1 \end{bmatrix}$$

Find A.^2 and A.^3

>> A = [6 3; 7 -1];↵

>> A.^2 ↵

ans =

36 9

49 1

>> A.^3 ↵

ans =

216 27

343 -1

For example (usual method)

$$A = \begin{bmatrix} 6 & 3 \\ 7 & -1 \end{bmatrix}$$

```
>> A = [6  3 ; 7  -1] ;↵
>> A^2 ↵
ans =
    57   15
    35   22
```

* The square root of the matrix :- (sqrt)

For example

$$A = \begin{bmatrix} 16 & 36 \\ 81 & 49 \end{bmatrix}$$

```
>> A = [16  36 ; 81  49] ;↵
>> sqrt(A) ↵
ans =
    4   6
    9   7
```

* Signs and logical formulas in matlab.

1. A < B
2. A > B
3. A <= B
4. A >= B
5. A ~= B
6. A == B

When using the above cases, the results are either false (0) or true (1)

e.g

$$A = \begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix} \quad ; \quad B = \begin{bmatrix} 1 & 5 \\ 2 & 1 \end{bmatrix}$$

Find

① $A < B$ ② $A > B$ ③ $A == B$

Put the result in C_1, C_2, C_3 respectively

Sol:

```
>> A = [3 1; 0 2] ; B = [1 5; 2 1]; ↵
>> C1 = A<B ↵
C1 =
     0     1
     1     0
```

Correct answer → 1 0 ; wrong answer → 0 1

```
>> C2 = A>B ↵
C2 =
     1     0
     0     1
```

```
>> C3 = A==B ↵
C3 =
     0     0
     0     0
```