

Lecture 8

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

الماتريك الجبرية في المصفوفات في لغة البرمجة والماتريك في matlab

If you have

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

\* add (usual method)

لذلك  $\Rightarrow A = [9 \ 2 \ ; \ 5 \ 1] \ ; \ B = [1 \ 4 \ ; \ 6 \ 3]$

$\Rightarrow A+B \leftarrow$

ans =

$$\begin{bmatrix} 10 & 6 \\ 11 & 4 \end{bmatrix}$$

\* subtract (usual method)

$\Rightarrow A-B \leftarrow$

ans =

$$\begin{bmatrix} 8 & -2 \\ -1 & -2 \end{bmatrix}$$

\* multiplication (usual method)

$\Rightarrow A * B \leftarrow$

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

ans =

$$\begin{bmatrix} 21 & 42 \\ 11 & 23 \end{bmatrix}$$

(pointwise method)

$\Rightarrow A \cdot B \leftarrow$

in case  $m=n$  or  $m \neq n$

ans =

$$\begin{bmatrix} 9 & 8 \\ 30 & 3 \end{bmatrix}$$

\* Division : (only the pointwise case)

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for example

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

Find division

$$\gg A = \{\text{matrix writing}\}; B = \{\text{matrix writing}\} \downarrow$$

$$\gg A \cdot / B \downarrow$$

ans =

$$\begin{matrix} 9 & 0.5 \\ 0.83 & 0.33 \end{matrix}$$

\* Raise the matrix : (1)

for example (pointwise method)

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

Find  $A^{12}$  and  $A^{13}$

$$\gg A = [6 \ 3; 7 \ -1] \downarrow$$

$$\gg A^{12} \downarrow$$

ans =

$$\begin{matrix} 36 & 9 \\ 49 & 1 \end{matrix}$$

$$\gg A^{13} \downarrow$$

ans =

$$\begin{matrix} 216 & 27 \\ 343 & -1 \end{matrix}$$

For example (usual method)

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

>> A = [6 3 ; 7 -1];

>> A^2

ans =

$$\begin{bmatrix} 57 & 15 \\ 35 & 22 \end{bmatrix}$$

\* 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 =

$$\begin{bmatrix} 4 & 6 \\ 9 & 7 \end{bmatrix}$$

\* Signs and logical formulas in matlab.

①  $A < B$       3-  $A \leq B$       5-  $A \sim B$

②  $A > B$       4-  $A \geq B$       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  $A == B$

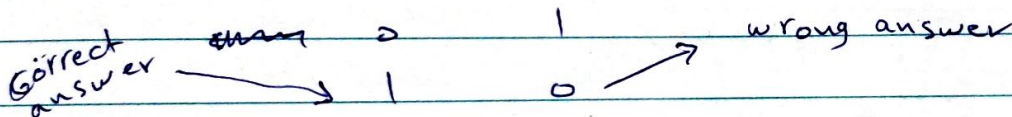
Put the result in  $C_1, C_2, C_3$  respectively

Sol

$$\Rightarrow A = [3 \ 1 \ ; \ 0 \ 2] \ ; \ B = [1 \ 5 \ ; \ 2 \ 1] \ ; \ \leftarrow$$

$$\Rightarrow C_1 = A < B \ \leftarrow$$

$C_1 =$



$$\Rightarrow C_2 = A > B \ \leftarrow$$

$C_2 =$

1	0
0	1

$$\Rightarrow C_3 = A == B \ \leftarrow$$

$C_3 =$

0	0
0	0