Lecture 5:

④ triu(A): To Create an upper triangular matrix

For example

$$A = \begin{bmatrix} 1 & 2 & 0.3 \\ 0.5 & 1 & 0.6 \\ 3 & 4 & 10 \end{bmatrix}$$

Application

```
>> A = [1 2 0.3; 0.5 1 0.6; 3 4 10];↵
>> B = triu(A) ↵
```

B =

1	2	0.3
0	1	0.6
0	0	10

⑤ tril(A): To create lower triangular matrix

For example

$$A = \begin{bmatrix} -4 & 10 & 2 \\ 5 & -6 & 30 \\ 11 & 3.6 & 9 \end{bmatrix}$$; find the lower triangular matrix

Application

```
>> A = [-4 10 2; 5 -6 30; 2 30 9]↵
>> B = tril(A) ↵
```

B =

-4	0	0
5	-6	0
11	3.6	9

⑥ Command the upper and lewer triangular matrix in the following cases

B = triu(A, K) ; K = 0 ; K > 0 ; K < 0

B = tril(A, K) ; K = 0 ; K > 0 ; K < 0

① B = triu(A, K)

when K = 0 ; find the upper triangular matrix (A)

$$A = \begin{bmatrix} 3 & -8 & -3 \\ 6 & 1 & 4 \\ 8 & -5 & 7 \end{bmatrix}$$

Sol:

```
>> A=[3 -8 -3; 6 1 4; 8 -5 7];↵
>> B1 = triu(A,0) ↵
```

B1 =

3	-8	-3
0	1	4
0	0	7

When $K > 0$, for example $K = 1$

```
>> B2 = triu(A,1) ↵
```

$B_2 =$

$$\begin{matrix} 0 & -8 & -3 \\ 0 & 0 & 4 \\ 0 & 0 & 0 \end{matrix}$$

When $K < 0$, for example $K = -1$

```
>> B3 = triu(A,-1) ↵
```

$B_3 =$

$$\begin{matrix} 3 & -8 & -3 \\ 6 & 1 & 4 \\ 0 & -5 & 7 \end{matrix}$$

When $K = 2$, then

```
>> B4 = triu(A,2) ↵
```

$B_4 =$

$$\begin{matrix} 0 & 0 & -3 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{matrix}$$

(2) B = tril(A, k)

When k = 0, find the lower triangular matrix (A).

$$A = \begin{bmatrix} 3 & -8 & -3 \\ 6 & 1 & 4 \\ 8 & -5 & 7 \end{bmatrix}$$

```
>> A = [ 3  -8  -3; 6  1  4; 8  -5  7];
>> C1 = tril(A, 0)
```

C1 =

```
3   0   0
6   1   0
8  -5   7
```

when k > 0, for example k = 1

```
>> C2 = tril(A, 1)
```

C2 =

```
3  -8   0
6   1   4
8  -5   7
```

when k < 0, e.g k = -1, then

```
>> C3 = tril(A, -1)
```

C3 =

```
0   0   0
6   0   0
8  -5   0
```

(7) A(i,:) Drag all elements of the row (i)
A(:,j) " " " " " " Column (j)

Ex

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & -1 & 1 \\ 2 & 1 & 0 \end{bmatrix}$$

```
>> A = [1 -1 1; 0 -1 1; 2 1 0];↵
>> z1 = A(1,:) ↵
z1 =
     1    -1     1
```

```
>> z2 = A(:,3) ↵
z2 =
     1
     1
     0
```

```
>> z3 = A(:,:) ↵
z3 =
     1    -1     1
     0    -1     1
     2     1     0
```

```
>> z4 = A(:) ↵
z4 =
     1
     0
     2
     :
     :
     0
```

(8) rand(m, n): Create a random matrix with order (m, n)

For example

>> r = rand(2, 3) ↵

Remark:

① When using this command, the results will differ each time, as well as between computers.

② value of elements are between (0 & 1)

e.g m = n = 3

>> r1 = rand(3) ↵