LEC (7)

✓ How to form a matrix based on a specific vector? متجه معين

Example // Let (a) be a 3*3 matrix where:

$$a = \begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{matrix}$$

وليكن $V = [3\ 1\ 2]$ أنشئ مصفوفة B وقيمتها:

Let $v = [3\ \ 1\ \ 2]$

Create a matrix B and its value:

$$b = a(v, 2)$$

This depends on the vector v

Solution//

We note that this command creates a matrix b whose elements are from the elements of matrix a such that:

نلاحظ ان هذا الأمر يعمل على تكوين مصفوفة b عناصرها من عناصر المصفوفة aبحيث أن:

$$b(1,1) = a(3,2)$$

$$b(1,2) = a(1,2)$$

$$b(1,3) = a(2,2)$$

$$b = \begin{matrix} 8 \\ 2 \\ 5 \end{matrix}$$

Q/ Let (d) be a matrix with capacity 5*5 and let (r) be a vector where:

Let a=[1 2 3 4 5;7 8 9 4 5;2 -1 -7 -8 -9;-9 0 0 1 3;8 10 20 55 7]

And

$r = [3 \;\; 2 \;\; 1 \;\; 5 \;\; 4]$

Create a matrix based on what you are given:

1. $f_1 = a(2,r) = \begin{matrix} 9 & 8 & 7 & 5 & 4 \\ 2 & & & & \\ 7 & & & & \end{matrix}$
2. $f_2 = a(r,1) = \begin{matrix} 1 \\ 8 \\ -9 \end{matrix}$
3. $f_3 = a(4,r) = ?$
4. $f_4 = a(r,3) = ?$
5. $f_5 = a(r,4) = ?$

✓ *Note // If (r) contains a negative number or exceeds the number of rows or columns, then this value is either made zero or the statement that it is greater than the capacity of the matrix appears.*

if it was

$$a = \begin{matrix} 2 & 4 & 6 & 8 \\ 1 & 2 & 3 & 4 \\ 10 & 20 & 30 & 40 \\ 20 & 40 & 60 & 80 \end{matrix}$$

✓ *Let* $v = [2,1,1]$ *be a vector and (a) be a matrix, then:*

$c = a(v,:)$

$$c = \begin{matrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 2 & 4 & 6 & 8 \end{matrix}$$

Let $c = a(:,v)$

$$c = \begin{matrix} column(2) & column(4) & column(1) \\ 4 & 8 & 2 \\ 2 & 4 & 1 \\ 20 & 40 & 10 \\ 40 & 80 & 20 \end{matrix}$$

✓ ***Cumsum(a)*** **:***It is used to find the cumulative total.* المجموع التراكمي

General formula $(cumsum(a))$

Example: Let

$$a = \begin{matrix} 1 & 2 & 3 \\ 6 & 2 & 1 \\ -7 & 2 & 3 \end{matrix}$$

find $b = cumsum(a)$

Solution:

$$b = \begin{matrix} 1 & 2 & 3 \\ 7 & 4 & 4 \\ 0 & 6 & 7 \end{matrix}$$

- ✓ **Prod(a)** :Used to multiply each column. ضرب كل عمود ككل
- ✓ ***General formula (prod(a))***

Example: Let

$$a = \begin{matrix} 1 & 2 & 3 \\ 5 & -5 & 2 \\ 0 & 2 & 3 \end{matrix}$$

find $d = prod(a))$

Solution:

$$d = \begin{matrix} 0 & -20 & 18 \end{matrix}$$

- ✓ **cumprod**: *It is used for the cumulative product:*
- ✓ ***General formula (cumprod(a))***

Example: Let

$$a = \begin{matrix} 1 & 2 & 3 \\ 5 & 1 & 3 \\ -2 & 6 & 2 \end{matrix}$$

Solution:

$$w = cumprod(a)$$

$$w = \begin{matrix} 1 & 2 & 3 \\ 5 & 2 & 9 \\ -10 & 24 & 18 \end{matrix}$$