MATLAB

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المرحلة الثانية - صباحي

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Lecture 13

Example (2):

```
>> D = [2 5 4; 2 4 1];
>> E = [1 2; 3 4; 7 2];
>> m3 = D * E
m3 =
    45   32
    21   22
>> m4 = E * D
m4 =
     6   13    6
    14   31   16
    18   43   30
```

15) To find the sum of the elements of one row or one column in a matrix :

Example :

```
>> A = [2 5 4; 2 4 1]
A =
     2     5     4
     2     4     1
```

1) `>> S1 = sum(A(1,:))` — ١) لايجاد مجموع عناصر الصف الاول في المصفوفة A

```
S1 =
    11
```

2) `>> S2 = sum(A(2,:))` — ٢) لايجاد مجموع عناصر الصف الثاني في المصفوفة A

```
S2 =
     7
```

3) >> S3 = sum(A(:,2)) ↵ ٣) لايجاد مجموع عناصر العمود الثاني في المصفوفة A

S3 = 9

4) >> S4 = sum(A(:,3)) ↵ ٤) لايجاد مجموع عناصر العمود الثالث في المصفوفة A

S4 = 5

16) To find the transpose of a matrix :

Example :

>> B=[1 3 5;2 6 7;4 9 8] ↵

B =

1	3	5
2	6	7
4	9	8

>> B' ↵

ans =

1	2	4
3	6	9
5	7	8

17) To find the determinant of a matrix :

Example :

>> C=[2 2;7 2] ↵

```
C =
     2   2
     7   2
>> det(C) ↵
ans =
    -10
```

18) To find the inverse of a matrix :

Example :

```
>> C=[2 2;7 2] ↵
C =
     2   2
     7   2
>> inv(C) ↵
ans =
   -0.2000    0.2000
    0.7000   -0.2000
```

19) To find the size of a matrix :

Example :

```
>> B=[2 5 3 1;4 6 2 9]; ↵
>> size(B) ↵
ans =
     2   4
```

Lecture 14

Solving a System of Linear Equations :

1) Solving a system of linear equations by using inverse matrix method in MATLAB prog.

Example : Solve the following system of linear equations by using inverse matrix method in MATLAB prog. :

$$x + y + z = 2$$
$$2x + 3y - z = 9$$
$$x + 3y + 2z = 5$$

Answer :

```
>> A = [1 1 1; 2 3 -1; 1 3 2]; ↵
>> A1 = inv(A); ↵
>> B = [2; 9; 5]; ↵
>> X = A1 * B ↵
X =
     1
     2
    -1
```

$\therefore x = 1, y = 2$ and $z = -1$

Exercise : Solve the following system of linear equations by using inverse matrix method in MATLAB prog. :

$$x + 8y + 2z = -1$$
$$x + 3y + z = 4$$
$$x + 3y + 2z = 3$$

(ans. $x = 7.4$, $y = -0.8$, and $z = -1$)

2) Solving a system of linear equations by using Cramer's rule in MATLAB prog. .

Example: Solve the following system of linear equations by using Cramer's rule in MATLAB prog. :

$$x + y + z = 2$$
$$2x + 3y - z = 9$$
$$x + 3y + 2z = 5$$

Answer:

```
>> A2 = [1 1 1; 2 3 -1; 1 3 2];↵
>> A21 = [2 1 1; 9 3 -1; 5 3 2];↵
>> A22 = [1 2 1; 2 9 -1; 1 5 2];↵
>> A23 = [1 1 2; 2 3 9; 1 3 5];↵
>> x = det(A21) / det(A2)↵
x =
    1.0000

>> y = det(A22)/det(A2)↵
y =
    2.0000

>> z = det(A23)/det(A2)↵
z =
   -1.0000
```

Exercise: Solve the following system of linear equations by using Cramer's rule in MATLAB prog. :

Lecture 15

$$x + 8y + 2z = -1$$
$$x + 3y + z = 4$$
$$x + 3y + 2z = 3$$

(ans. $x = 7.4$, $y = -0.8$, and $z = -1$)

3) Solving a system of linear equations by using the Gauss-Jordan elimination method in MATLAB prog.

Example : Solve the following system of linear equations by using the Gauss-Jordan elimination method in MATLAB prog. :

$$x + y + z = 2$$
$$2x + 3y - z = 9$$
$$x + 3y + 2z = 5$$

Answer :

```
>> A=[1 1 1;2 3 -1;1 3 2];↵
>> b=[2;9;5];↵
>> X=[A b]↵
X =
     1     1     1     2
     2     3    -1     9
     1     3     2     5

>> rref(X)↵
ans =
     1     0     0     1
     0     1     0     2
     0     0     1    -1
```

∴ $x = 1$, $y = 2$ and $z = -1$

Exercise : Solve the following system of linear equations by using the Gauss_Jordan elimination method in MATLAB prog. :

$$x + 8y + 2z = -1$$
$$x + 3y + z = 4$$
$$x + 3y + 2z = 3$$

(ans. $x = 7.4$, $y = -0.8$, and $z = -1$)

Solved Problem :

Solve the following system of linear equations in MATLAB prog. :

$$x + y + 2z = 14$$
$$x - 3y + 2z = 10$$
$$2x - y + 2z = 15$$

1) by using inverse matrix method.
2) by using Cramer's rule.
3) by using Gauss_Jordan elimination method.

Solution :

1)
```
>> A = [1 1 2; 1 -3 2; 2 -1 2];↵
>> B = [14; 10; 15];↵
>> A1 = inv(A);↵
>> X = A1 * B ↵
X =
    3
    1
    5
```
∴ $x = 3$, $y = 1$, and $z = 5$

2) >> A1 = [1 1 2; 1 -3 2; 2 -1 2]; ↵

>> A11 = [14 1 2; 10 -3 2; 15 -1 2]; ↵

>> A12 = [1 14 2; 1 10 2; 2 15 2]; ↵

>> A13 = [1 1 14; 1 -3 10; 2 -1 15]; ↵

>> X = det(A11)/det(A1) ↵

X = 3

>> y = det(A12)/det(A1) ↵

y = 1

>> z = det(A13)/det(A1) ↵

z = 5

∴ X = 3, y = 1, and z = 5

3) >> A = [1 1 2; 1 -3 2; 2 -1 2]; ↵

>> b = [14; 10; 15]; ↵

>> X = [A b] ↵

X =

1	1	2	14
1	-3	2	10
2	-1	2	15

>> rref(X) ↵

ans =

1	0	0	3
0	1	0	1
0	0	1	5

∴ X = 3, y = 1, and z = 5 .