



Al-Mustaqbal University

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Lecture No.: 2

Lecture Title: [First Steps With MATLAB]





Computer 2 (MATLAB)

حاسوب 2 (ماتلاب)
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Week 2

by

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Learning Objectives

- Get familiar with basic MATLAB operations and expressions.
- Learn how to create and manipulate matrices.
- Understand variable assignments and simple matrix generation.





First Steps with MATLAB (1)

- To get MATLAB to work out basic operations, simply type at the command prompt:

$1 + 1$

- MATLAB responds with: $\text{ans} = 2$

```
Command Window
>> 1 + 1

ans =

     2

fx>> |
```



First Steps with MATLAB (2)

- MATLAB stores the result in the variable **ans**, which you can reuse.
- Ex: **ans * ans**
- MATLAB responds with: **ans = 4**

```
Command Window
>> 1 + 1

ans =

     2

>> ans * ans

ans =

     4

fx >> |
```



Spacing in MATLAB Expression

- The spacing of operators doesn't affect the result.

$$1 + 3 * 2 - 1 / 2 * 4$$

- Gives the same answer as:

$$1+3*2-1/2*4$$

- Clearer formatting improves **readability**. Use parentheses for clarity:

$$1 + 3*2 - (1/2)*4$$



Entering Matrices in MATLAB

- Steps to type a matrix into MATLAB:
 - Begin with a square bracket **[**.
 - Separate elements in a row with **spaces** or **commas**.
 - Use a semicolon **;** to separate rows.
 - End with a square bracket **]**.
- Example: **$a = [1 \ 2 \ 3; 4 \ 5 \ 6; 7 \ 8 \ 9]$**

```
Command Window

>> a = [1 2 3; 4 5 6; 7 8 9]

a =

     1     2     3
     4     5     6
     7     8     9

fx >> |
```



Variables and Assignment in MATLAB

- Variables are memory locations used to store data.
- Variable names can include letters and digits but must start with a letter.
- MATLAB does not require variable declarations, but this can sometimes lead to errors.
- Assignment Example:

`a = 6;`

`name = 'Mark';`





Variables in MATLAB

- Definition: A variable is a named location in memory that stores data.
- Rules for Variable Names:
 - Must start with a letter.
 - Can include letters, numbers, and underscores (_).
 - MATLAB is case-sensitive (e.g., myVar and myvar are **different**).





Variables in MATLAB

- Examples of valid variables:

`x = 5;`

`speed_of_light = 3e8;`

`temperature1 = 298;`

- Invalid variables:

- Numbers or special characters at the start (e.g., `1stVar` or `@value`).





Variable Assignment

- Assignment Statement Format:

`variable_name = expression;`

- Examples:

`a = 10;`

`b = 25 + 7;`

`c = sqrt(a)`

- Reassigning Values:

- You can update the value of a variable at any time:

`a = 10;`

`a = a + 5;`





Displaying Variables

- Use the `disp` function to display variable contents.
- Example:
`disp(a);`
`disp(name);`





Generating Matrices with MATLAB

- MATLAB offers functions for generating specific types of matrices:
 - `zeros(m, n)`: Generates a matrix filled with zeros.
 - `ones(m, n)`: Generates a matrix filled with ones.
 - `randi(max_val, [m, n])`: Generates a matrix with random integers.
 - `eye(n)`: Generates an identity matrix.



Generating Matrices with MATLAB

- Examples:

`u = randi(10, [2 2])`

`u =`

7	2
9	4

Command Window

```
>> u = randi(10, [3 3])
```

`u =`

9	8	7
10	8	2
7	4	8



Try on your machine

- `Z = zeros(3, 3);`
- `O = ones(2, 4);`
- `U = randi(5, [3, 3]);`
- `I = eye(4);`





Practice Exercise 1

- Task: Create matrices using zeros, ones, and randi functions.
- Example:
 - Create a 5x5 matrix of random integers between 1 and 10.
 - Create a 3x3 identity matrix and a 4x4 matrix filled with ones.





Practice Exercise 2

- Task: Define variables and perform arithmetic operations.
- Example:
 - Assign values to two variables and compute their sum, product, and difference.
 - Display the result using disp.





Review of Key Concepts

- Recap:
 - How to enter expressions and work with the **ans** variable.
 - Properly **spacing** operations for readability.
 - Creating matrices manually and using matrix generators (zeros, ones, randi, eye).
 - Variable assignment and displaying results using **disp**





Let's try MATLAB

Install MATLAB and familiarise yourself with its interface.

