

By

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Second Class

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Chapter -1-

• MATLAB

MATLAB (an abbreviation of "matrix laboratory") is a proprietary multi-model programming language and numerical computing environment developed by MathWorks . MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms.

• Why Matlab is useful?

- 1- Conducting mathematical and engineering operations.
- 2- Development of algorithms.
- 3- Modeling and simulations.
- 4- Data analysis and presentation.
- 5- Conducting engineering graphs.
- 6- Application development.

• Matlab Windows

Work area divided into three Main area, which are the following:

1- Command Window: This is the main window commands can also be type on this screen and the results were shown in it .

2-Workspace : MATLAB records the inputs and outputs in this screen.

3-Command History: This is the space in which MATLAB stores the previous commands.

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Current Folder	Command Window	6	Workspace
Name Zoom.ink	<pre>>> % Matlab 2013 >> A=[2 4 6] A =</pre>		Name Value M A [2,4,6] 2 B [3,5,7] C [1,1,1] 1 MATLAB records the input and output in WORKSPACE
The current folder is a reference location that MATLAB uses to find files.	>> C=B-A C = 1 1 1 fx; >>	The Command Window is one of the main tools you use to enter data, run MATLAB functions and other M -files, and display result	Command History \$ 6/10/2020 9:02 PM\$ -\$ 6/10/2020 9:50 PM\$ -\$ 6/10/2020 11:53 PM\$ -\$ 6/10/2020 11:53 PM\$ -clc -\$ Matlab 2013 -A=[2 4 6] B=[3,5,7] C=B-A
Zoom.Ink (Shortcut)			Command History lists the time and date of each session in the short date format for your operating system

• General Commands in Matlab

1-Stopping MATLAB in different ways:

a- By means of the command: quit

b- Clicking on the cross in the upper right of your window.

2-Changing Font Size:

On the Home tab, in the Environment section, click Preferences ► Fonts and select a font size.

3- Some delete commands in matlab

a- Type clc : To clear your command window without erasing the variables and functions that you have recorded in the Workspace window or the command history window

b- To remove a variable or data in workspace type <u>clear</u>: You can also clear a specific variable: just follow the clear command with the variable name.

C- To clear all windows such as Command window, command history and workspace:

On tab <u>HOME</u> Go to \longrightarrow Clear command window

Clear command History

Clear workspace

- d- Clear : Use to Remove variables from the memory.
- 4- help: search for help
- 5-Exist: check if the variable exists or not and gives either 0 or 1
- 6 load: Load variables from the workspace.
- 7 % : To Put titles during programming.

Symbol	Operation	Matlab form
^	power	A^B
*	multiplication	A*B
/	right division (slash)	A/B
\	left division (backslash)	A\B=B/A
+	addition or plus	A+B
-	subtraction or negation	A-B

Arithmetic operations

Example :

1) Write using matlab the following : 1) $A = 6\frac{10}{13} + 18\frac{5}{7} + 5 \ (9)^2$

SOL : A=6*(10/13) +18 *(5/7)+5*(9^2) A = 422.4725 A=(6*(10/13)) +(18*(5/7))+(5*(9^2)) A = 422.4725

2) Find the value of z if you know that x = 2, y = 17

$$Z = X^{3} + Y^{2} + \frac{3\pi}{X^{2} + Y^{2}}$$

$$x = 2$$

$$y = 3$$

$$z = x^{3} + y^{2} + (3*pi/(x^{2} + y^{2}))$$

$$z = 17.2$$

$$3)f(X) = X^{3} + \sin(9X)$$

$$f(X) = X^{3} + \sin(9 * X)$$

4) Solve the following equation :

$$y = e^{-a}\sin(x) + 10\sqrt{y}$$

a = 5; x = 2; y = 8; y = exp(-a)*sin(x)+10*sqrt(y) y = 28.2904 To calculate sin($\pi/4$) and e10, we enter the following commands in MATLAB, sin(pi/4) ans = 0.7071 >> exp(10) ans = 2.2026e+004

```
4) Find derivative for the function f
a) f = x<sup>2</sup>e<sup>x</sup>
f=2*x*exp(x)+x^2*exp(x)
By matlab
syms x
diff (f)
b) g = xy + x<sup>2</sup>
syms x y
diff (g)
```

5) Find integral for the this function:

a)
$$\int_{2}^{3} (8x^{3} + 3x^{2} + 6x) dx$$

= $8 \frac{x^{4}}{4} + 3 \frac{x^{3}}{3} + 6 \frac{x^{2}}{2} \vdots^{3}$

By matlab

int((8*x^3+ 3*x^2+6*x),2,3)

H.W 1//

• $Y = \frac{2e^{2t} + 2e^{-t}}{\log 2}$ • $a = \frac{2x}{4y}$ • $b = \pi r^2$ • $c = \frac{x}{2x - y^2}$ • $x(t) = e^{-0.1t}$ • $d = \sqrt{x^2 + y^2}$

•
$$e = \frac{\sin 2t + \cos 5t}{2}$$

H.W 2// Find the derivative for the following function:

1)
$$f = \sin(\pi t)$$

2) $f = \cos(x^2) + \sin(x)$
3) $f = \frac{2x}{x^2 - 1}$
4) $f = \frac{1}{1 + e^{-x}}$

H.W // Find integral for the following function:

1)
$$f = \int_0^\pi \sin(x) \, dx$$

2)
$$f = \int_1^4 x e^x(x) \, dx$$

3)
$$f = \int_0^1 \sqrt{1 + x^3} \, dx$$

Chapter -2-

<u>M Files</u>

MATLAB allows writing Several kinds of program files we mention some of them:

<u>Scripts:</u> Are the kind of files script that a program works on MATLAB as a means of entering commands and code, where program commands are edited in a File Script.

Functions: functions files are also program files with .m extension. Functions can accept inputs and return outputs. Internal variables are local to the function.

• <u>Create a new File-M:</u>

There are two ways to create a new file to write MATLAB:

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1- First way: -from the Home menu choose new script as in the following: -

2- <u>Second way</u>: -from the Home menu choose new _____ script as in the following:



3- <u>Third Method</u>: Type the edit command inside the Window Command window as follows:

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4- *Fourth Method*: In the right upper part of the matlab program we choose Blank script as follows:

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<u>Fifth method</u>: In the keyboard click (ctrl+N) <u>Methods for storing programs in an m-file</u>

First way: In the EDITOR list in m-file choose icon save as the follows:

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<u>Second way</u>: In the EDITOR list in m-file choose icon Run as the follows:



<u>Third way</u> : In the right upper part of the matlab program we choose <u>save</u> as follows

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Fourth method: Use F5 or (ctrl+S) from the keyboard.

General Note:

1-We can implementation of specific step in command program by select those steps and use the right click and choose *Evaluate Selection*.

2- we can get all the windows through : Menu Home ----- Layout ----- Default

3- We can enter several step in the command window without running by using (Shift +Enter) after each step.