Introduction to MATLAB

Section 1
By: Eng/ Dalia Tarek

Agenda

01

Introduction

MATLAB History:

Designed to do mathematical operations using Matrices.

This name short for two words:

MATrix **LAB**oratory

Prof. Cleve Moler wrote the first version of **MATLAB** in 1970s.

MATLAB integrates **computation** + **visualization** + **programming** in a very easy way to use .

Advantage of MATLAB:

Easy to use.

Platform independence.

Predefined functions.

Graphical User Interface (**GUI**).

Uses of MATLAB:

Creating Algorithms.

Building Application.

Data Analytics.

Computer Vision.

Deep Learning.

Control Systems.

02

Running MATLAB

Open online MATLAB:

1.   Open Link:
https://matlab.mathworks.com

2.   Click create one.

Open online MATLAB:

1. Fill all information.

2. If you have license enter it (*University Email have License*).

3. Else you try online MATLAB free trail for 30 days.

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ℹ To access your organization's MATLAB license, use your school or work email.
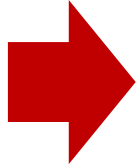
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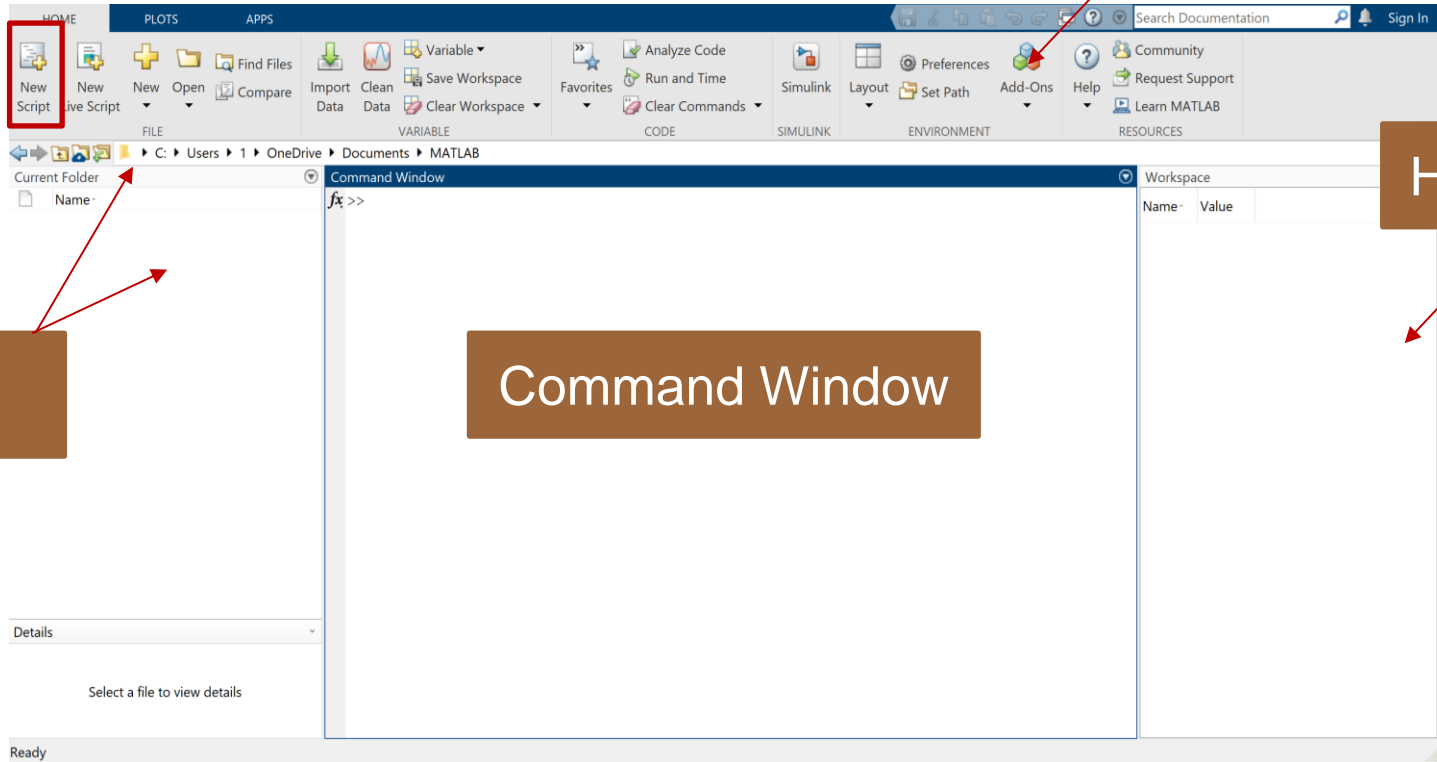Open MATLAB Online to add content and get started.

MATLAB Window:

To Install Additional Tools

New Script

History

Current Files

Command Window

M-Files (Script):

❑ It is a file with an abbreviation (.m) in which commands are written and compiled instead of writing them to me (command window) screen .

❑ It can also be used in writing functions.

❑ It is possible that we write all the previous operations at once in the same file and it will be done Implemented sequentially .

M-Files (Script):
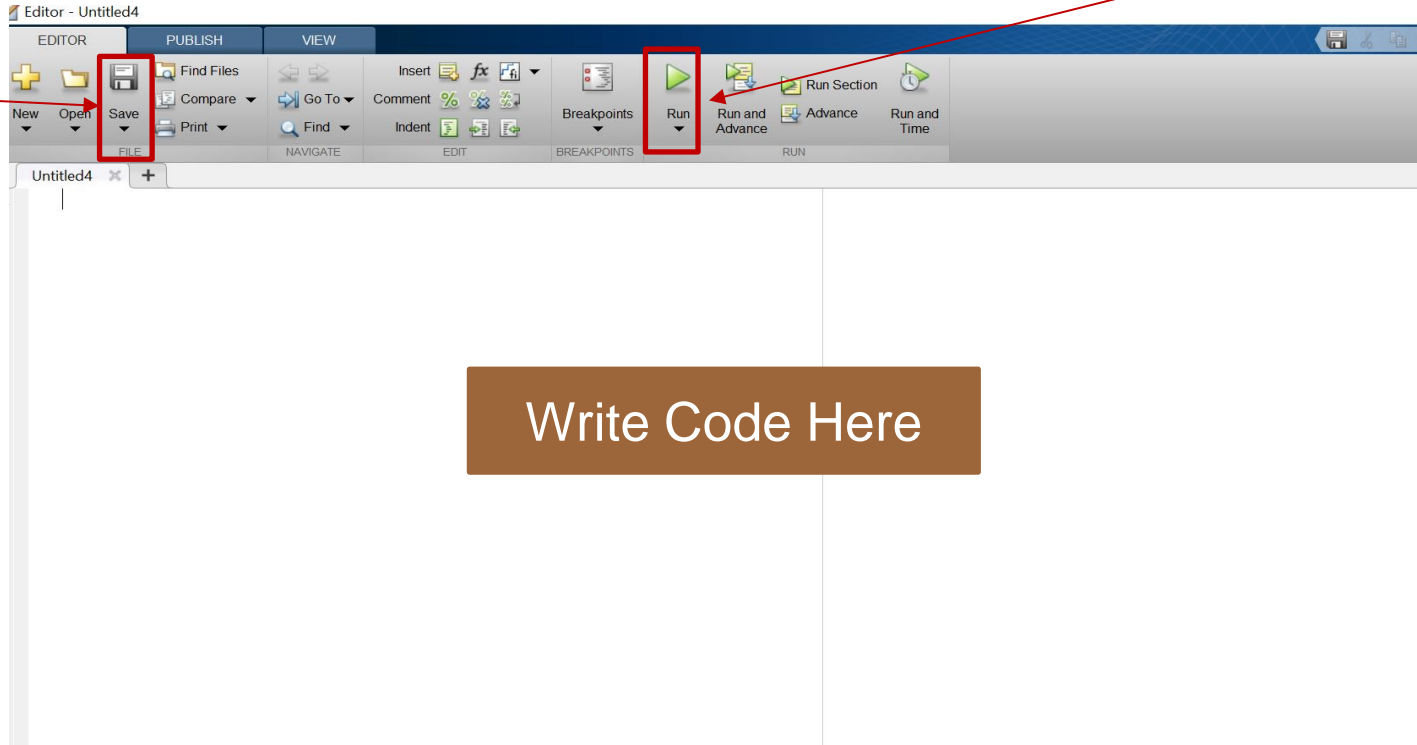
03

Variables

Variables

```
>> a = 12 ;     %variable a is assigned 12
```

MATLAB promot

Assign operator

Prevent result to appear

Comment

Commands:

CLC	To clean the command window
Clear	To removes all the variables from memory.
Clear x,y	To removes only variables **X,Y** from memory.
Who	Lists the variables currently in the workspace.
Help	Lists topics on which help is available.
Help *Topic*	Provides help on topic.

Commands:

Quit, Exit	Close MATLAB.
Format compact	To removes external spaces.
Format Loose	To add external spaces..
Mlock *fun*	Locks function fun so that **clear** cannot remove it.
Munlock *fun*	unlocks function fun so that **clear** can remove it.

Predefined variables:

ans	Represents a value computed by an expression but not stored in variable name.
pi	Represents the number π.
inf	Represents infinity which for instance occurs as a result of a division by zero.
i or j	Defined as −1 , which is: 0 + 1.0000i.
Nan	Stands for Not a Number.
date	Represents the current date in a character string format.
clock	Represents the current time in a six-element row vector.

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Mathematical Operations

Arithmetic operations:

Arithmetic operation	Symbol	Example
Addition	+	2 + 4= 6
Subtract	-	4 - 2= 2
Multiplication	*	4 * 2 = 8
Right Division	/	4 / 2 = 2
Left Division	\	4 \ 2 = 2 / 4= 1/2
Exponentiation	^	4 ^ 2 = 16

Common math functions:

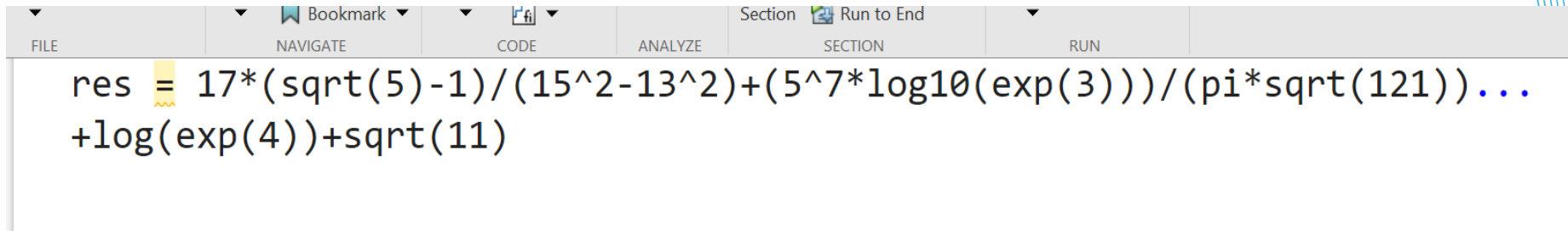| Function	Description
abs(x)	Computes the absolute value of x.
sqrt(x)	Computes the square root of x.
round(x)	Rounds x to the nearest integer.
fix(x)	Rounds x to the nearest integer toward 0.
floor(x)	Rounds x to the nearest integer toward $-\infty$.
ceil(x)	Rounds x to the nearest integer toward ∞.
exp(x)	Computes e^x, where e is the base for natural logarithms.
log(x)	Computes ln x, the natural logarithm of x to the base e.
log10(x)	Computes log10 x, the common logarithm of x to the base 10.
rem(x,y)	Returns the remainder of x/y.

Trigonometric functions:

Function	Description
sin(x)	Computes the sine of x, where x is in radians.
cos(x)	Computes the cosine of x, where x is in radians.
tan(x)	Computes the tangent of x, where x is in radians.
sind(x)	Computes the sine of x, where x is in degrees.
cosd(x)	Computes the cosine of x, where x is in degrees.
tand(x)	Computes the tangent of x, where x is in degrees.

Example:

Compute the following quantity using MATLAB in the Command Window:

$$\frac{17\left[\sqrt{5}-1\right]}{\left[15^2-13^2\right]}+\frac{5^7\log_{10}(e^3)}{\pi\sqrt{121}}+\ln(e^4)+\sqrt{11}$$

Answer:

```
res = 17*(sqrt(5)-1)/(15^2-13^2)+(5^7*log10(exp(3)))/(pi*sqrt(121))...
+log(exp(4))+sqrt(11)
```

```
res =

    2.9532e+03
```

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Tasks

Task 1:

Compute the following quantity using MATLAB in the Command Window:

$$B = \frac{\tan x + \sin 2x}{\cos x} + \log\left|x^5 - x^2\right| + \cos\ x - 2\tan\ x\ ; \quad \text{for } x = 5\pi/6.$$

Task 2:

Compute the following quantity using MATLAB in the Command Window:

$$x = a + \frac{ab}{c}\frac{(a+b)}{\sqrt{|ab|}} + c^a + \frac{\sqrt{14}\,b}{e^{3c}} + \ln(2) + \frac{\log_{10} c}{\log_{10}(a+b+c)}$$

for $a = 1$, $b = 2$ and $c = 1.8$.

THANKS!