

# MATLAB Basics

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# Introduction

- What is MATLAB ?
  - MATLAB is a computer program that combines computation and visualization power that makes it particularly useful tool for engineers.
  - MATLAB is an executive program, and a script can be made with a list of MATLAB commands like other programming language.
  
- MATLAB Stands for MATrix LABoratory.
  - The system was designed to make matrix computation particularly easy.
  
- The MATLAB environment allows the user to:
  - manage variables
  - import and export data
  - perform calculations
  - generate plots
  - develop and manage files for use with MATLAB.

# MATrix LABoratory

## Advantages of MATLAB

- Ease of use
- Platform independence
- Predefined functions
- Plotting

## • Disadvantages of MATLAB

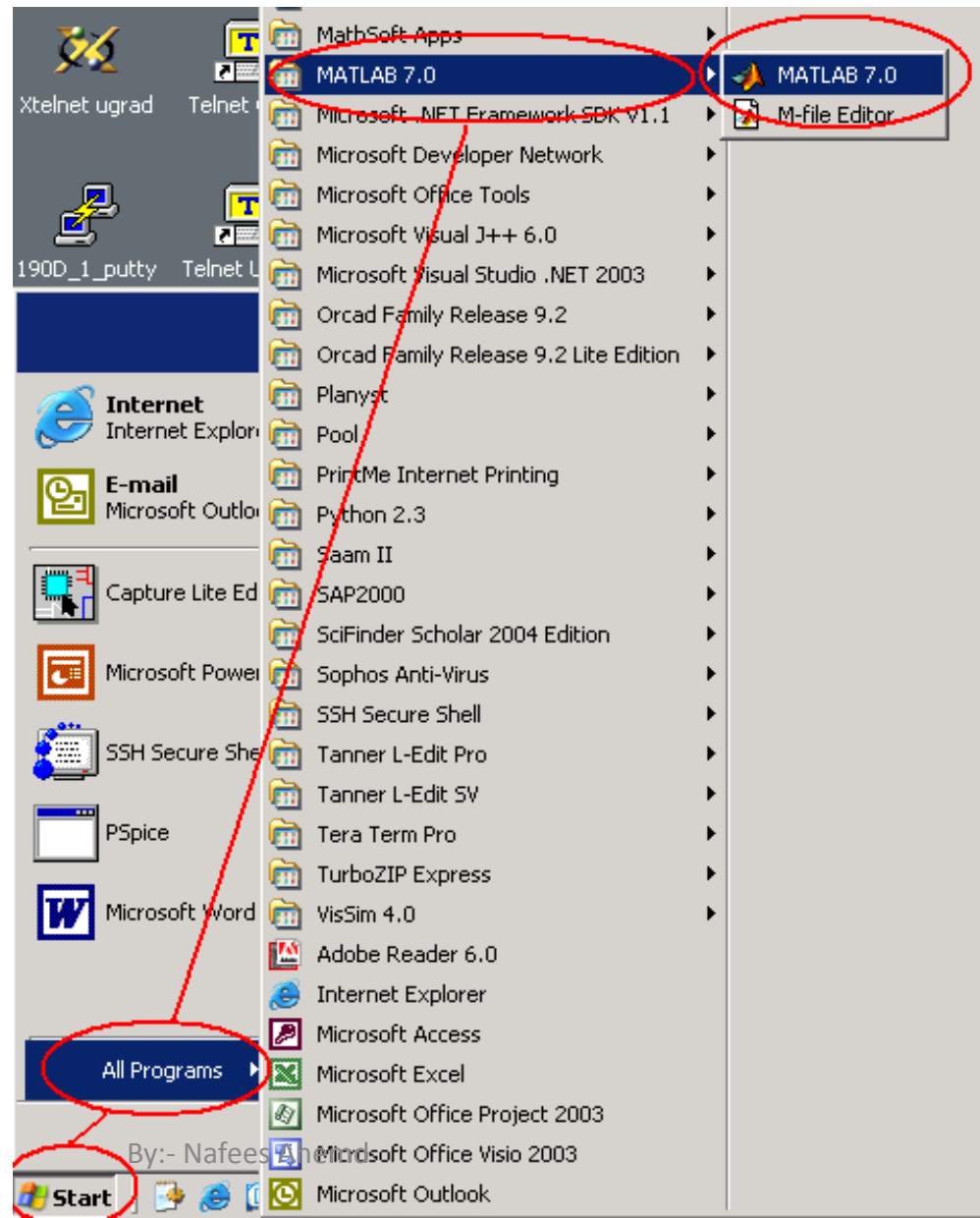
- Can be slow
- Commercial software

# Typical uses include

- Maths and computation
- Algorithm development
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including graphical user interface (GUI) building.

# MATLAB Environment

- To start MATLAB:
- START →
- PROGRAMS →
- MATLAB 7.0 →
- MATLAB 7.0



# Display Windows

The image shows the MATLAB 7.8.0 (R2009a) interface. The main window is the Command Window, which contains the text: "You may type the commands after the ">>" symbol." and "This is the command window, you can enter commands and data, and the results are displayed here." The Workspace window shows a table with columns for Name, Value, Min, and Max. The Command History window shows a list of commands: size(x); size(x); clear; a=[1 2 3; 4 5 6; 7 8 9]; size(a); length(a). The Current Directory window shows a list of files and folders in the MATLAB directory. A red arrow points to the Start button in the Windows taskbar, with the text "Start Button: Similar to Windows".

**Current Directory Window:**  
This is the directory that matlab will look at for all the files, make sure it is set to be right folder.

**Command Window:**  
You may type the commands after the ">>" symbol.  
This is the command window, you can enter commands and data, and the results are displayed here.

**Workspace Window:**  
List all the variable used

**Command History Window:**  
List all the command used

**Start Button:**  
Similar to Windows

# Display Windows with start button

The screenshot shows the MATLAB 7.8.0 (R2009a) environment. The main window is titled "MATLAB 7.8.0 (R2009a)" and contains a menu bar (File, Edit, Debug, Parallel, Desktop, Window, Help), a toolbar, and a "Current Directory" path of C:\Users\nafees\Documents\MATLAB. The interface is divided into several panes: "Current Directory" (showing files like slprj, DCMotorControl.m, etc.), "Command Window" (with a prompt >>), "Workspace" (empty), and "Command History" (showing recent commands like size(x), clear, a=[1 2 3; 4 5 6; 7 8 9];). The Windows Start menu is open, displaying a list of applications and toolboxes. The "Control System" toolbox is highlighted, showing sub-options like "LTI Viewer (lview)", "SISO Design Tool (sisotool)", "Preferences (ctrlpref)", "Help", "Demos", and "Product Page (Web)".

Current Directory: C:\Users\nafees\Documents\MATLAB

Command Window: >>

Workspace: Stack: Base

Command History: size(x); size(x); clear; a=[1 2 3; 4 5 6; 7 8 9]; size(a); length(a); edit a; a; clear a; clear; a=[1 2 3 ; 4 5 6]; length(a); clear command window; help clear; -- 7/18/11 11:05 AM --

Start menu items:

- MATLAB
- Toolboxes
  - Aerospace
  - Bioinformatics
  - Communications
  - Control System
    - LTI Viewer (lview)
    - SISO Design Tool (sisotool)
    - Preferences (ctrlpref)
    - Help
    - Demos
    - Product Page (Web)
  - Curve Fitting
  - Data Acquisition
  - Database
  - Datafeed
  - Econometrics
  - Filter Design
  - Filter Design HDL Coder
  - Financial
  - Financial Derivatives
  - More...
- Simulink
- Blocksets
- Links and Targets
- Shortcuts
- Desktop Tools
- Web
- Get Product Trials
- Check for Updates
- Preferences...
- Find Files...
- Help
- Demos

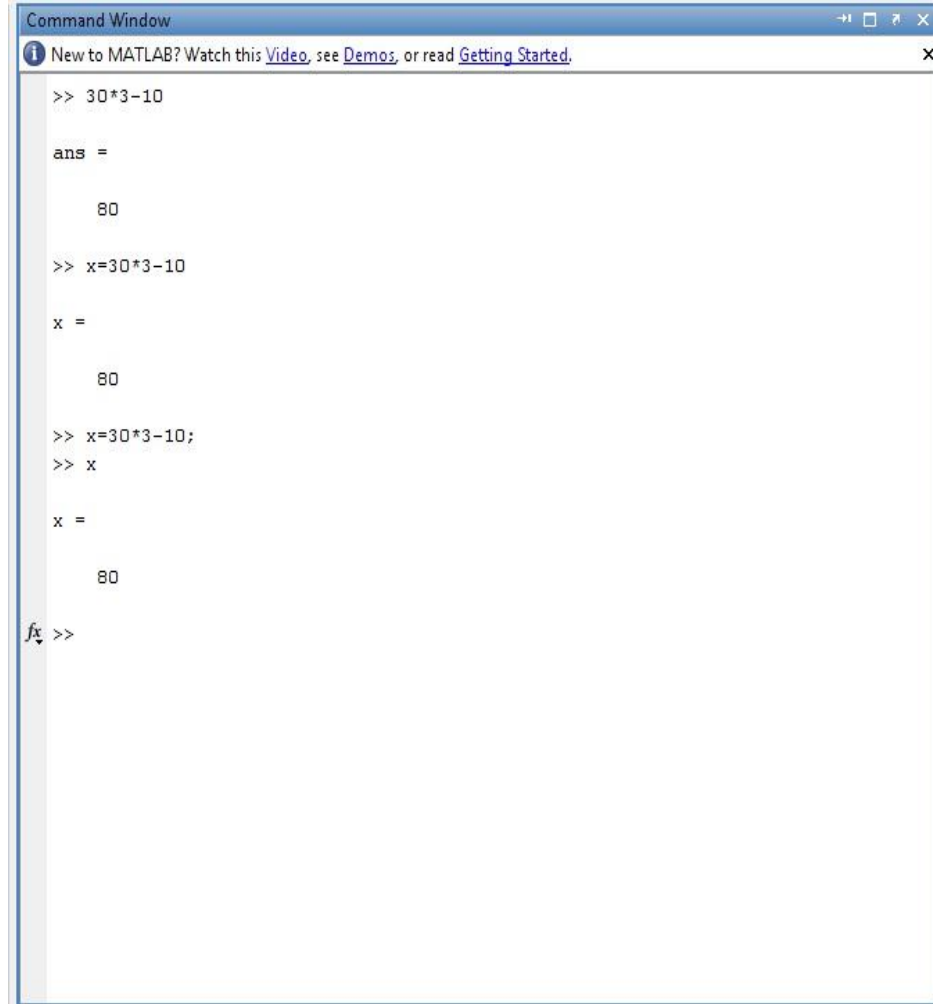
# Display Windows (con't...)

- Command Window: Enter all commands here
- Workspace Window: Shows the list of variable used
- Command History Window: Shows the command history
- Current Directory Window: Displays current working directory
- Graphic (Figure) Window
  - Displays plots and graphs
  - Created in response to graphics commands.
- M-file editor/debugger window
  - Create and edit scripts of commands called M-files.



# Command Window

- Here all the commands are entered.
- Try the following commands



```
Command Window
New to MATLAB? Watch this Video, see Demos, or read Getting Started.

>> 30*3-10

ans =

    80

>> x=30*3-10

x =

    80

>> x=30*3-10;
>> x

x =

    80

fx >>
```

# Example 1

- Find the value of  $z$  for the expression  $z=x+y$ , if  $x=5$  and  $y=7$ .
- Solution:



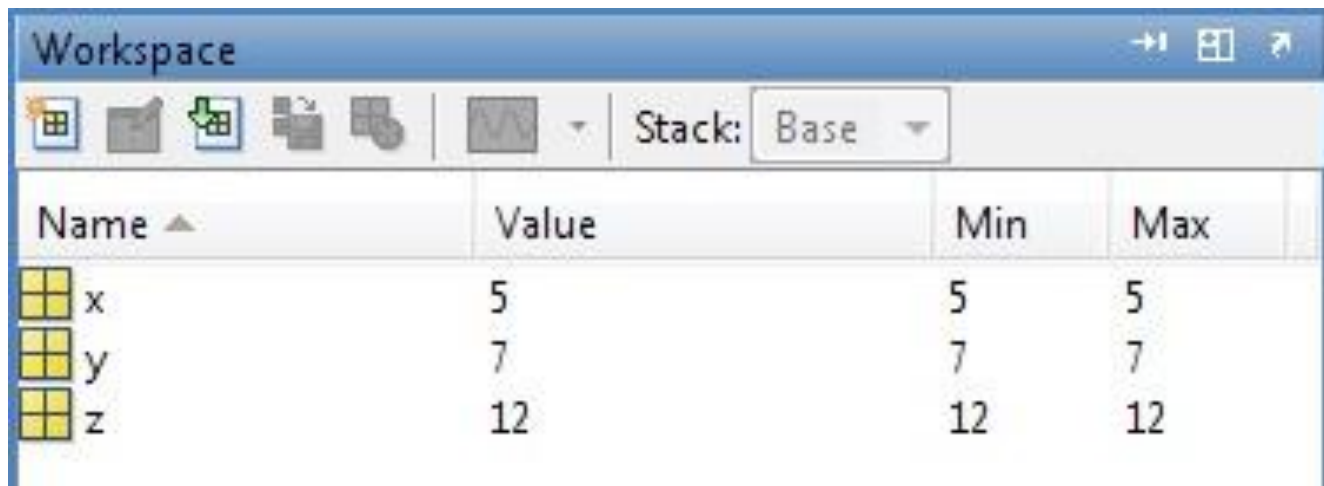
```
Command Window
New to MATLAB? Watch this Video, see Demos, or read Getting Started.
>> x=5;
>> y=7;
>> z=x+y;
>> z

z =

    12

fx >>
```

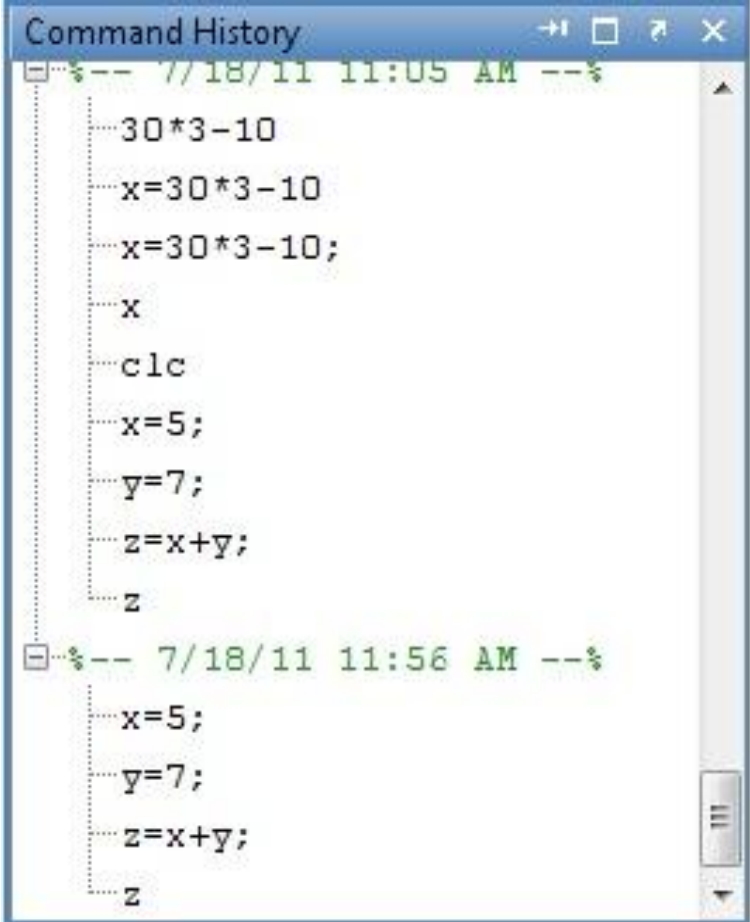
- Workspace windows for above example



The screenshot shows a 'Workspace' window with a toolbar and a table. The toolbar includes icons for grid, chart, and other workspace functions, along with a 'Stack: Base' dropdown menu. The table below displays the following data:

Name	Value	Min	Max
x	5	5	5
y	7	7	7
z	12	12	12

- Command history window for above example



```
Command History
%-- 7/18/11 11:05 AM --%
30*3-10
x=30*3-10
x=30*3-10;
x
clc
x=5;
y=7;
z=x+y;
z

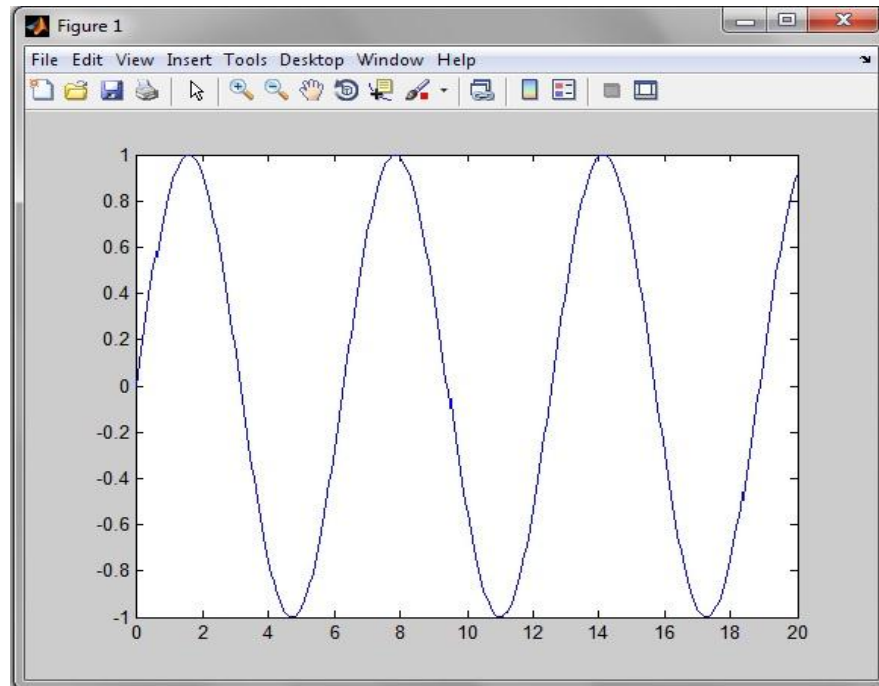
%-- 7/18/11 11:56 AM --%
x=5;
y=7;
z=x+y;
z
```

# Example 2: Graphic (Figure) Window

- Plotting the sin wave

```
Command Window
New to MATLAB? Watch this Video, see Demos, or read Getting Started.
>> x=0 : 0.05 : 20;
>> y=sin(x);
>> plot(x, y);
fx >>
```

- Figure window



# Types of Files

- 1. M-Files
- 2. MAT-Files
- 3. MEX-Files

# Types of Files cont...

- 1. M-Files:

ASCII text files with .m extension. Any program written in MATLAB editor is saved as M-file.

## Two types

- Script Files : .m files with MATLAB commands
- Function Files : .m files of function

# Types of Files cont...

- 2. MAT-Files:

Binary data file with .mat extension. These are created by MATLAB when data is saved from workspace.

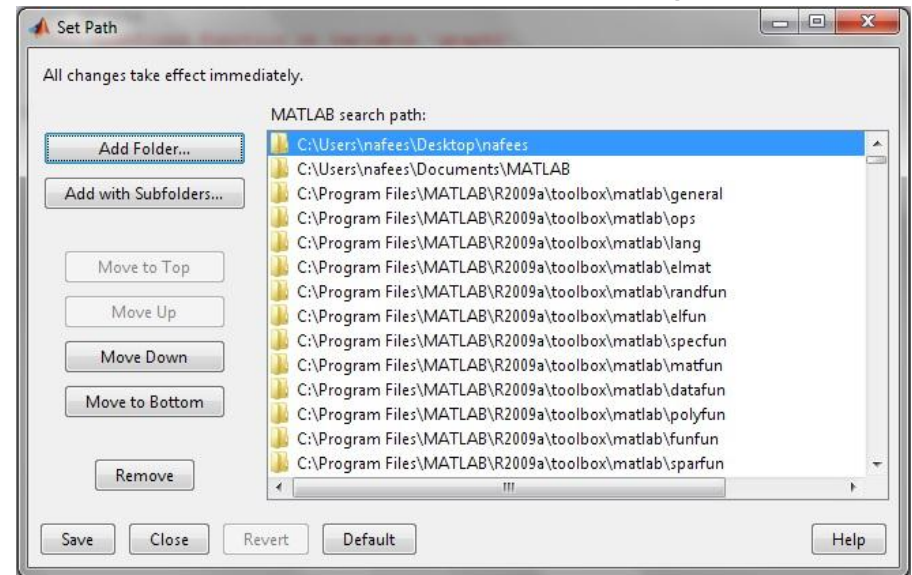
- 3. MEX-Files:

It is MATLAB callable FORTRAN and C Program, with .mex extension.



# Set Path

- To execute a file/help, it must be in proper (default) directory.
- If it is in some other folder, set the folder path
- Go to File->set Path->



# Some Commends

- **General Commands**

- Clock :Provides clock time and date as a vector
- Date :Provides date as a string
- Ver :Gives the version of MATLAB installed

- **Workspace Commands**

- Who :Lists the variables currently in the worksapce
- Whos :Same as who but gives more information such as type and size etc
- What :Lists .m, .mat and .mex files on the disk
- Clear :To clear workspace variables
- Clc :To clear command windows
- Clf :To clear current figure window

# Some Commends conti...

- **Termination**

- Ctl-c :local abort, kills the current command execution
- Quit :quits MATLAB
- Exit :same as quit

- **Help**

- help :lists topics on which help is available
- help help :provides information on use of the help command
- Helpwin :opens the interactive help window
- Helpdesk :opens the web browser based help facility
- help topic :provides help on topic
- Demo : runs the demo program
- lookfor *keyword* :Search all M-files for *keyword*
-

# Getting Help (con't...)

- Google “MATLAB helpdesk”
- Go to the [online HelpDesk](http://www.mathworks.com/helpdesk) provided by [www.mathworks.com](http://www.mathworks.com)

***You can find EVERYTHING you need to know about MATLAB from the online HelpDesk.***

# Questions?

