Chapter 1
Intro to MATLAB
MATLAB

- MATLAB stands for **Matrix Laboratory**
- MATLAB programming for Engineering introduces the MATLAB R2015b
- [http://ist.njit.edu/software](http://ist.njit.edu/software)
  - Release 2015a/2015b
Advantages of MATLAB

- Easy to use
- Platform Independence
- Predefined Functions
- Device- Independent Plotting
- Graphical User Interface
- MATLAB Compiler
Disadvantages of MATLAB

- MATLAB is based on an interpreted language and it may execute slower than compiled programs.
- A full copy of MATLAB is 5 to 10 times more expensive than a C/C++/Fortran compiler.
MATLAB Environment

- In **Windows** or **Apple** operating systems, click on the desktop icon.

- In **Unix/MSDOS** type `MATLAB` at the shell prompt.
The MATLAB Desktop

- MATLAB uses several different windows to display data, commands and results.
  
  - command window
  - toolstrip
  - command history window
  - document window
  - figure window
  - workspace browser
  - current folder browser
  - help browser
  - path browser

- They are not necessarily all open at once.
The MATLAB Desktop²
The Command Window
The Command Window

- A user can enter interactive commands at the command prompt (>>) in the command window.
- A user can place a series of commands into a script file, and the entire file can be executed by typing its name in the command window.
- MATLAB script files are also known as M-files, because they have a file extension of “.m”.
The Toolstrip

- The controls on the Toolstrip are organized into related categories of functions, first by tabs and then by groups.
- The Quick Access Toolbar is a place where the user can customize the interface.
The Command History
The Command History

- You can transfer commands from the command history to the command window
  - Double click on a command
  - Click and drag a command
  - Use arrow keys to select a command
- To delete commands from The History
  - Select a command or commands
  - Right-click with the mouse and select delete
  - Or select clear to clear the entail history
The Document Window

- It is also called Edit/Debug Window.
- An Edit Window is created when you create a new M-file or open an existing one.
- There are several ways to open an editing window:
  - Click the **New Script** icon
  - Click the New icon and then select **Script**
  - Type **edit** from the command window
The Document Window
The Document Window

![MATLAB Document Window](Image)

- MATLAB R2013b
- MATLAB Document Window with a script file opened, showing the command window and the editor window.

```
% mytest.m

1
2     disp('Hello World!')
3
```

- The script file contains a simple line of code that displays a message.
- The document window is used for editing and running MATLAB code.
Figure Window

- The figure window is used to display graphics.
- A figure can be a two- or three-dimensional plot of data.
- When figures are created a new window automatically opens.
- Figure window can be cleared by `clf`. 
Figure Window

```matlab
>> x=0:pi/40:2*pi;
>> y=sin(x)-cos(3*x);
>> plot(x,y,':or');
>> grid on
```
Docking & Undocking Windows

- When a window is docked, it appears as a pane within the MATLAB desktop.
Docking & Undocking Windows

- To undock a window, click the down-arrow icon in the upper-right corner of a pane.
The MATLAB Workspace

- A **workspace** is the collection of all the variables and arrays that are defined within the command window.
- This window is also called the **Workspace Browser**.
- A list of variables and arrays in the current workspace can be generated with the **who** or **whos** command.
The MATLAB Workspace

- The **who** and **whos** commands.
The MATLAB Workspace

- Use **clear** to delete a variable.
  - Syntax: `clear [variable-list]`
Array Editor

- Double clicking on any variable in the workspace will bring up the **Array Editor**.
Array Editor

ArrayEditor
Array Editor
Current Folder

- Also called the **current directory**.
- It shows all the files in the selected folder.
Current Folder

- It allows the user to manipulate files interactively.
Getting Help

- Use the Help Browser.
Getting Help

To show the usage of a known command, using the `help` command.
Getting Help³

- To search a command by keyword, using the `lookfor` command.
Useful Commands

- `who`
- `whos`
- `clear [var_list]`
- `more on/off`
- `Ctrl-C` (or `^C`)
- `clc` (not `cls`)
- `clf`
- `help command`
- `lookfor keyword`
- `demo`
- `which command`
Useful Commands

- Type **demo** in the command window.
Useful Commands

- To find out where a command is located, using the **which** command.
MATLAB Search Path

- If a name is typed at the system prompt, the MATLAB interpreter attempts to find the command as follows:
  - Checks as a variable in the workspace.
  - Checks as an M-file in the current folder.
  - Checks to see if it is an M-file in any directory along the MATLAB search path.
MATLAB Search Path

- Type `path` at the system prompt, the MATLAB search path will be listed.
Red Flags

- Don’t do the followings intentionally:
  - Do not use a variable with the same name as a system function or command.
  - Do not create an M-file with the same name as a system function or command.
Homework Assignment #1

- 1.6 Exercises
  - Page 24: 1.1, 1.3, 1.4, 1.8, 1.9, 10
- This assignment is due by next week.
- Late submission will be penalized.
- Hand-written homework will not be accepted or graded.
- Hand in a hardcopy of your homework, no electronic submission will be accepted.
How to Make Homework

- Make sure your command window is under format compact;
- Enter the homework questions line-by-line;
- Copy and paste the outputs including the commands into a word document and select the minimum spacing;
- Save figures into image files and then insert them into your document. You may need to change their sizes;
- Print your homework to a nearby printer.
How to Make Homework$^2$
How to Make Homework\textsuperscript{3}
How to Make Homework

```matlab
>> format compact
>> x=0:pi/40:2*pi;
>> y=cos(x)-sin(3*x);
>> plot(x,y); grid
```