

# ENGR 121: Computation Lab 1

## Lab I: Introduction to MATLAB

### 1 Introduction and Lab Goals

The goal of this lab is to familiarize students to MATLAB. MATLAB is an advanced numeric computation tool capable of analyzing large amounts of data. Figure 1, shows the default window and its specific areas.

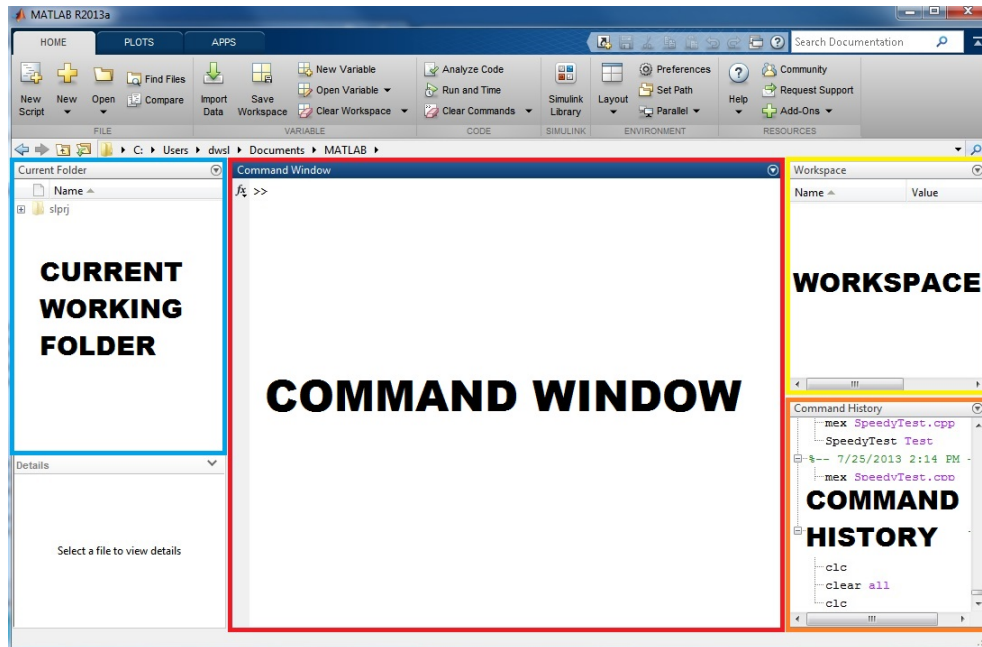


Figure 1: The MATLAB start screen and its specific areas.

**Command Window:** This is the main window where we will be interacting with MATLAB. Command window accepts user input and returns any applicable result back to the user. Each command is written on a new line, which is indicated by the `>>` command prompt. Once a command is executed, its result will be displayed right underneath (if applicable) and a new command prompt will be presented.

**Command History:** MATLAB keeps track of all the commands it executed. You can use this window to see your previous commands. Any command you want to re-execute can simply be dragged and dropped on to the command window.

**Workspace:** Any variable you create in MATLAB will be available in this window. In addition to the variable name, you can also see its current value.

**Current Folder:** We will need to save some files later in the course. This window shows the default save location for MATLAB.

MATLAB is capable of performing complicated computations with ease along with providing highly customizable figures (line plots, histograms, animations). In this lab, we will also leverage MATLAB's plotting capabilities.

## 2 Lab Outcomes

By the end of this lab, you should be proficient in:

1. successfully identifying the different components of the MATLAB interface.
2. executing simple MATLAB commands (e.g., `clear`, `close`, `clc`).
3. variable assignments, operator precedence, relational expressions.
4. generating random numbers.

## 3 Lab Procedures

In this lab, you will perform the following tasks:

1. Launch MATLAB and familiarize yourselves with the interface.
  - (a) Identify the specific windows shown in Figure 1.
  - (b) Run the following commands one by one and observe what they do. Pay attention to the workspace as you run these commands

```
2+2
A = 24
B = 4 * A
B = B + 2
C = [1 2 3 4 5]
D = [1 2; 3 4]
size(C)
size(D)
clear ans
who
clc
clear all
r = 5;
2 * pi * r
pi * (r^2)
Z = X * 4
theta = 2 * sin(pi/4)
Q = exp(-3 * theta)
```

2. Think about what the results would be for the following expressions and then type them in to verify your answers.

$1 \setminus 2$   
 $-5 \wedge 2$   
 $(-5) \wedge 2$   
 $10 - 6/2$   
 $5 * 4 / 2 * 3$

3. Use the **help** function to find out what the rounding functions **fix**, **floor**, **ceil**, **round** do. Experiment with them by passing different values to the functions including some negative, some positive, and some functions with fractions less than 0.5 and some greater.
4. Create the following random numbers: real number in the range (0,1); ten real numbers in the range (0, 100); ten real numbers in the inclusive range or closed interval (50, 100); integer in the inclusive range from 1 to 100; ten integers in the inclusive range from 20 to 35.
5. Think about what would be produced by the following expressions, then type them in to verify your answers.

$3 == 5 + 2$   
 $'b' < 'a' + 1$   
 $10 > 5 + 2$   
 $(10 > 5) + 2$   
 $'c == d' - 1 \ \&\& \ 2 < 4$   
 $'c == d' - 1 \ \|\ 2 > 4$   
 $10 > 5 > 2$