Objective

- Familiarize with matlab
- Creating variables and learning about variables types
- Arithmetique operation on variables
- Working with user Input and Output and creating comments
- Cell and struct

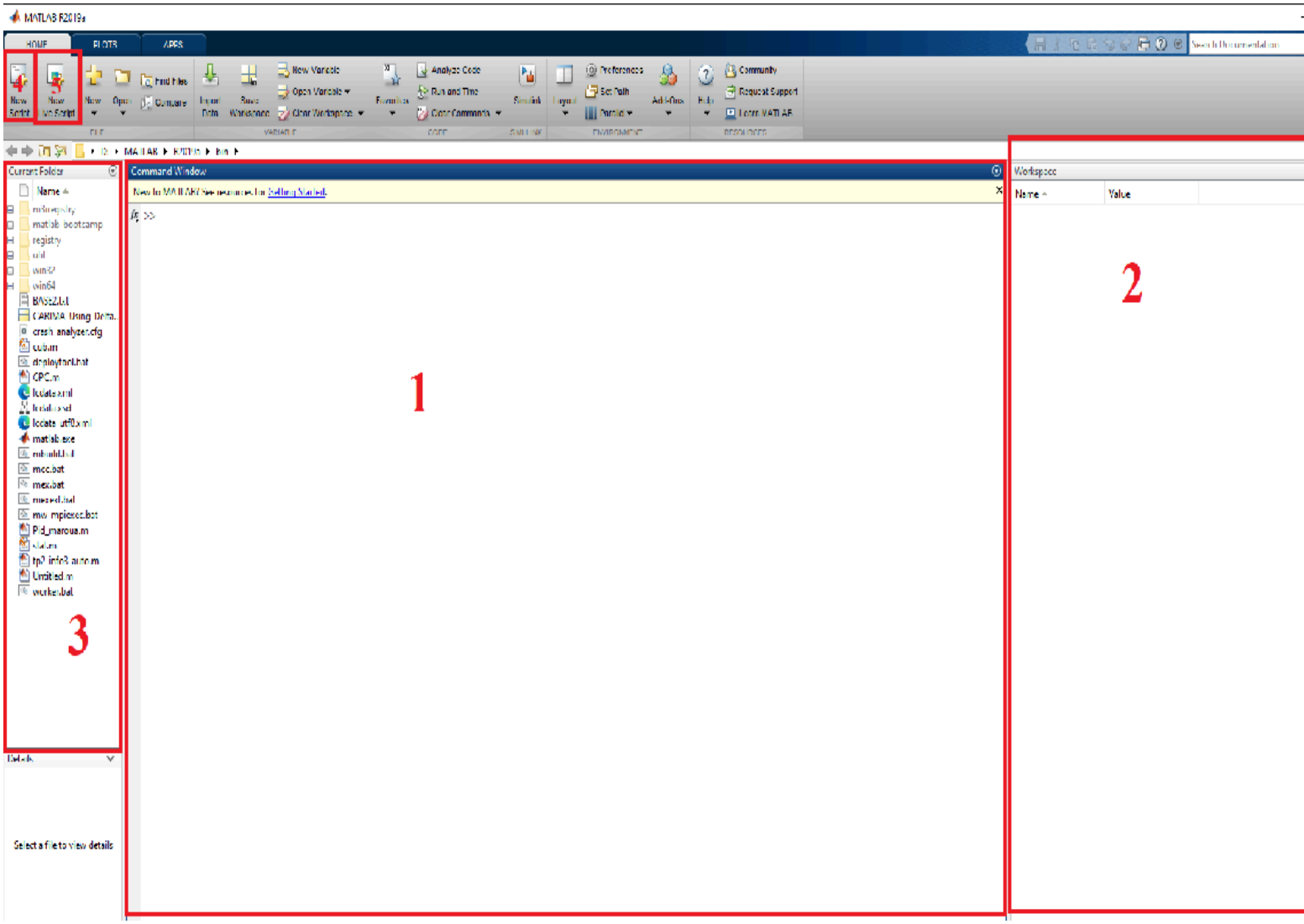
Familize with matlab

Introduction

Matlab is a programming and numeric computing platform for engineering and scientific applications like data analysis, signal and image processing, control systems, wireless communications, and robotics.

MATLAB is also the foundation for Simulink, a block diagram environment for simulating complex multi-domain systems.

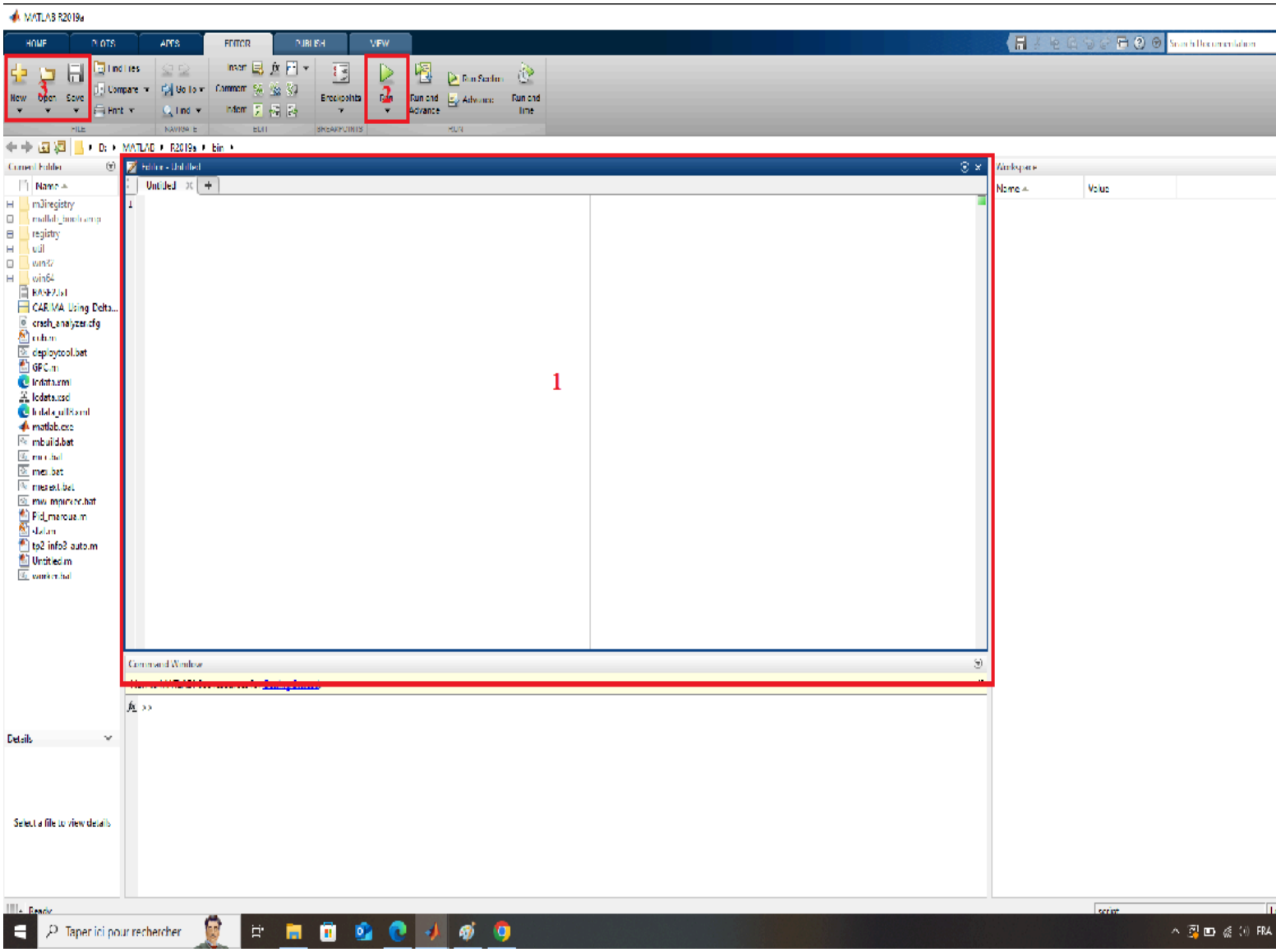
Matlab environment



1. Command window we can do calculation on it and write basic command

2. Workspace every variable we will create will be represented there with it value and it type
3. File directory show the current working directory , you can select some of matlabe files from there
4. New Script most time you will work with it , you use it to create matlab files
5. New Live Script it create new live script a matlab source code file that can include text and images like this one ,it used by teacher researcher to write reports

After creating New Script you will get this as result



1. Text editor you will write your code there
2. Run buttom after finishing writting your code click it to run the code
3. **New:** create new file, **Open:** open existing file, **Save:** to save the current selected file

Variables

Introduction

Variables are boxes that can hold value inside them , to create variables all we need is a name for variable and value that it will hold

Example :

```
pi = 3.14
K =  'K'
my_name = "Ali"
is_student = true
```

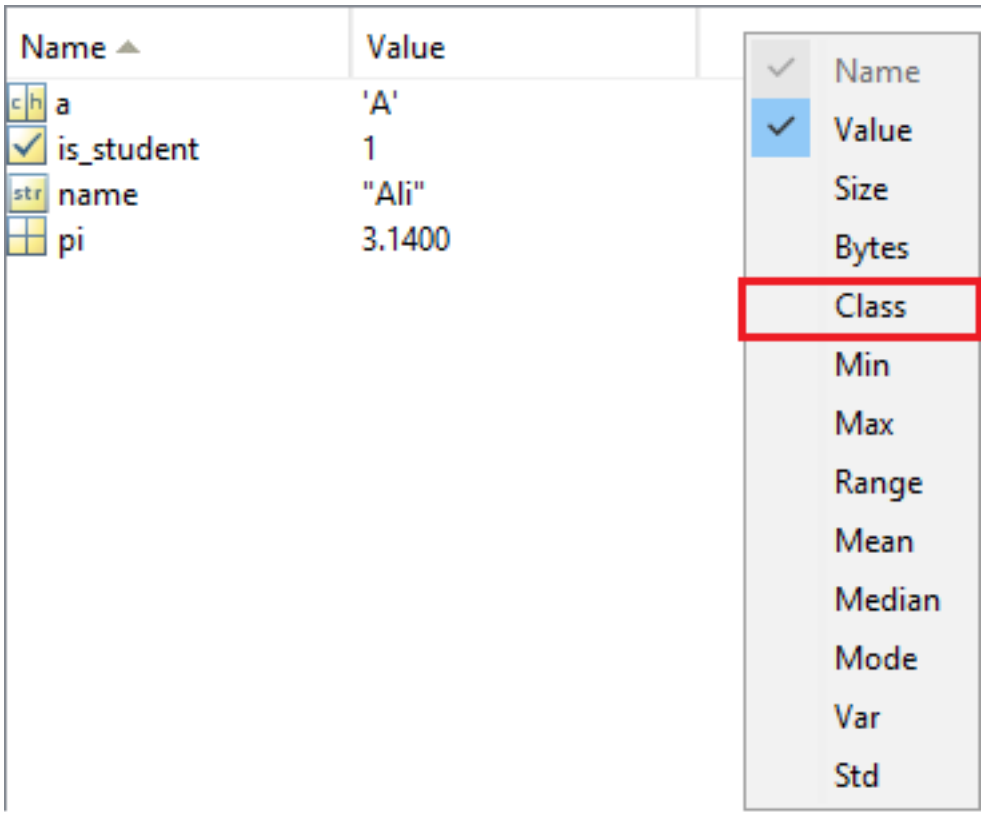
Variables types :

Variables type represent the type of data that the variable hold we can see in the above example that pi is numeric variable it type will be double, a represent 1 character it type is char and last thing name represent a string

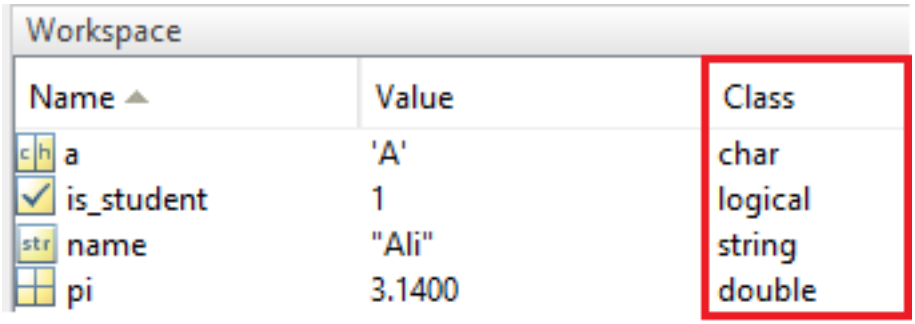
- double represent any numeric variable
- char represent 1 character or array of characters
- string represent a word more then 1 character
- logical representa logic value it can be true (1) or false (0)

Visualising variables type

After creating variables we can check their type on the workspace by enabling the class column



Result



To clear work space we all we need is to use the command **clear all**

Arithmetique operation on variables

we saw how to decalre variables now we will see how to do arithmetique operation on them

- Addition to add two variables together we use +
- Soustraction to soustract one variable from another one we use -
- Multiplication to multiple 2 variables we use *
- Diviosion to make division between 2 variables we use /
- Power to calculate power of variable to another one we do ^

Example :

```
a = 5
b = 2
c = a + b
d = a - b
e = a * b
f = a / b
g = a ^ b
```

Remarque

We notice each time we run our code the result get displayed to the console we can prevent this by adding **;** at the end of each line.

Matlab respect the order of arithmetic operateur / and * are have priority over + and - so if we want calculate something like they moyen of 3 numbers we should put the sum inside () after it we do the division.

Example :

```
A = 4;
B = 5;
C = 6;
m1 = A + B + C / 3;
m2 = (A + B + C) / 3;
disp(m1);
disp(m1);
```

Reading user input and displaying data

Reading user Input

So far we saw how to create variable but problems is that we where giving value to those variables inside our code , to change them we need to modify our script to fix that we will read those value from the user now , we do that by using the **input()** function.

Example :

```
name = input("Enter your name : ");
number = input("Enter number : ");
result = number^2;
```

Displaying data

Now to display data to user all we need to use is the **disp()** function.

Example :

```
number = input("Enter number : ");
disp(number * 10);
```

Comments

Comments are lines that matlab will not display , to create comment we just have to start the line with **%**.

Comments are usefull to add dsicription to our code and what it do also we can turn some of code lines into comment when we have error and we testing what we did wrong

Example :

```
%this line is comment
disp("hello")
```

Array and Struct

sometimes we have many valze that all reference to same type , we can create a variable for each value but this will become annoying and will make stuff more complex that what it is to fix this we can use array ad struct

Array

Array is list of value that can be same or difference type , lets suppose we want create Collection of colors we can do that by creating variable for each color but we know that all those values refer to the same entity which is color , so it better to create variable named color and store all those data inside it

We create using **{}** and we put values inside it ceperated by , or space for vertical array and we use ; to create horizontal array

To access elements of array we use the array name followed by **{index}** index represent the position of the element we want to get , the counting start from 1

```
color1 = "red";
```

```
color2 = "green";
color3 = "yellow";
colors_v = {"green" "red" "yello"}; % Vertical array
colors_h = {"green";"red";"yello"};% Horizontal array
disp(colors_v{2}); % this will display red
```

```
red
```

Struct

We use struct to store variables as key value ,lets suppose we want to represent student ,to create a student we want to store his age his name his id, so we need 3 keys name,age and id

we can create such struct with 2 methods

- by using **student = struct(key1,value1,key2,value2,key3,value3)**
- by creating empty struct with **student=struct()** then filling the data using **student.key1=value1**

We can read value inside struct by using the variable name followed by . then the key to this value

```
student1 = struct("name","Ali","age",23,"id","48799592949");
student2 = struct()
```

```
student2 = struct with no fields.
```

```
student2.name = "Tigui";
student2.age = 23;
student2.id = "497929292";
disp(student2.name)
```

```
Tigui
```

Tasks

Task 1:

Create Program that read radius of circle from the user then it calculate the surface and display it

```
%
```

Task2

Create program that store information about 2 of your friend (name, age, favourite colors,hobbies)

```
% For this program you will need struct and array
```