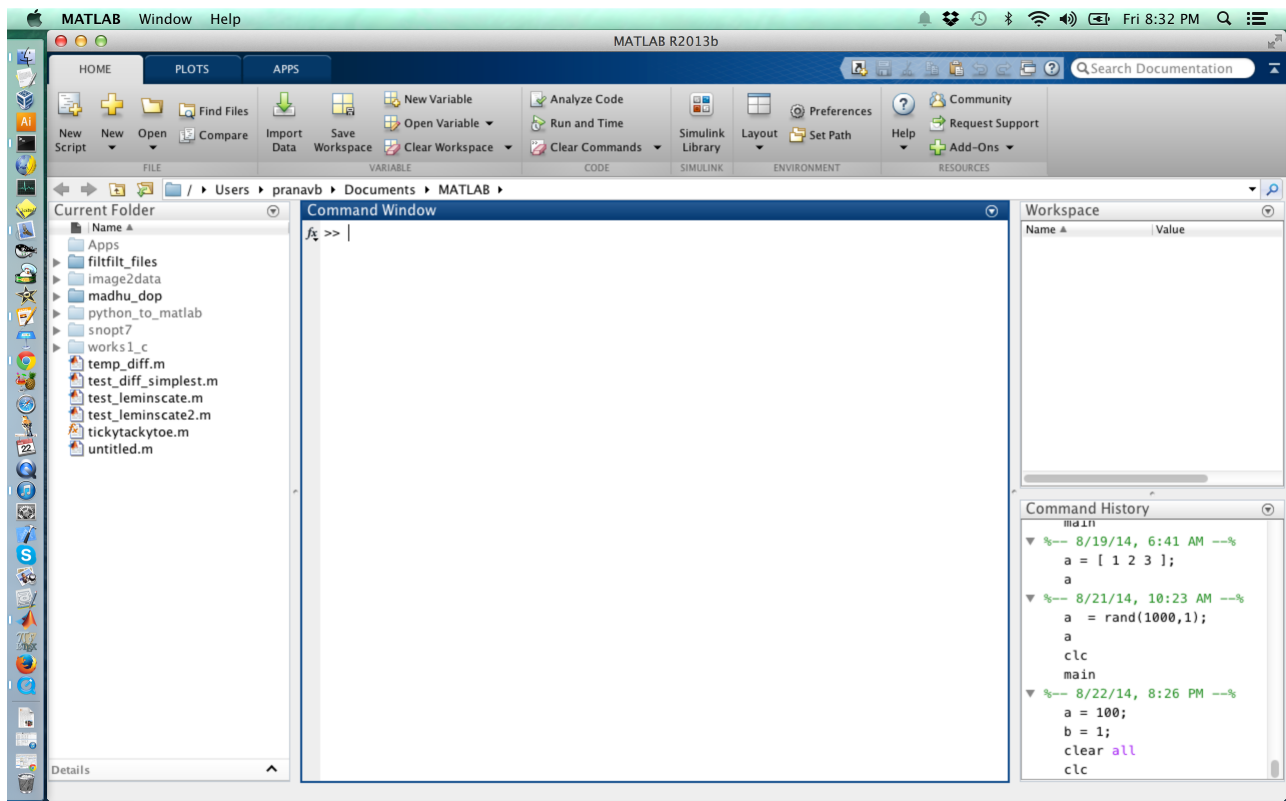Pranav Bhounsule
MATLAB Basics. **Using command line**

1. Start MATLAB by navigating through your installed application or click the short cut icon for MATLAB shown next.
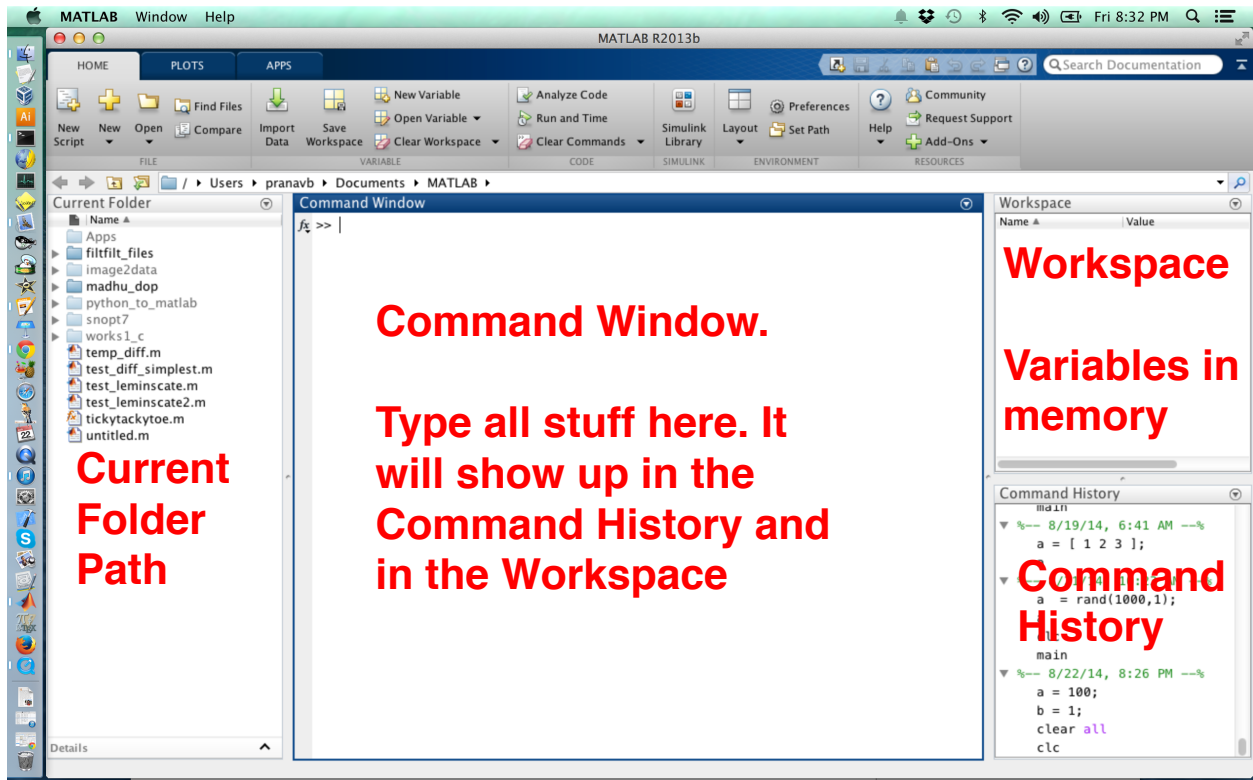

2. You will see the following screen once MATLAB loads up.

If you don't see something like that above, then go to Layout > Default Layout.
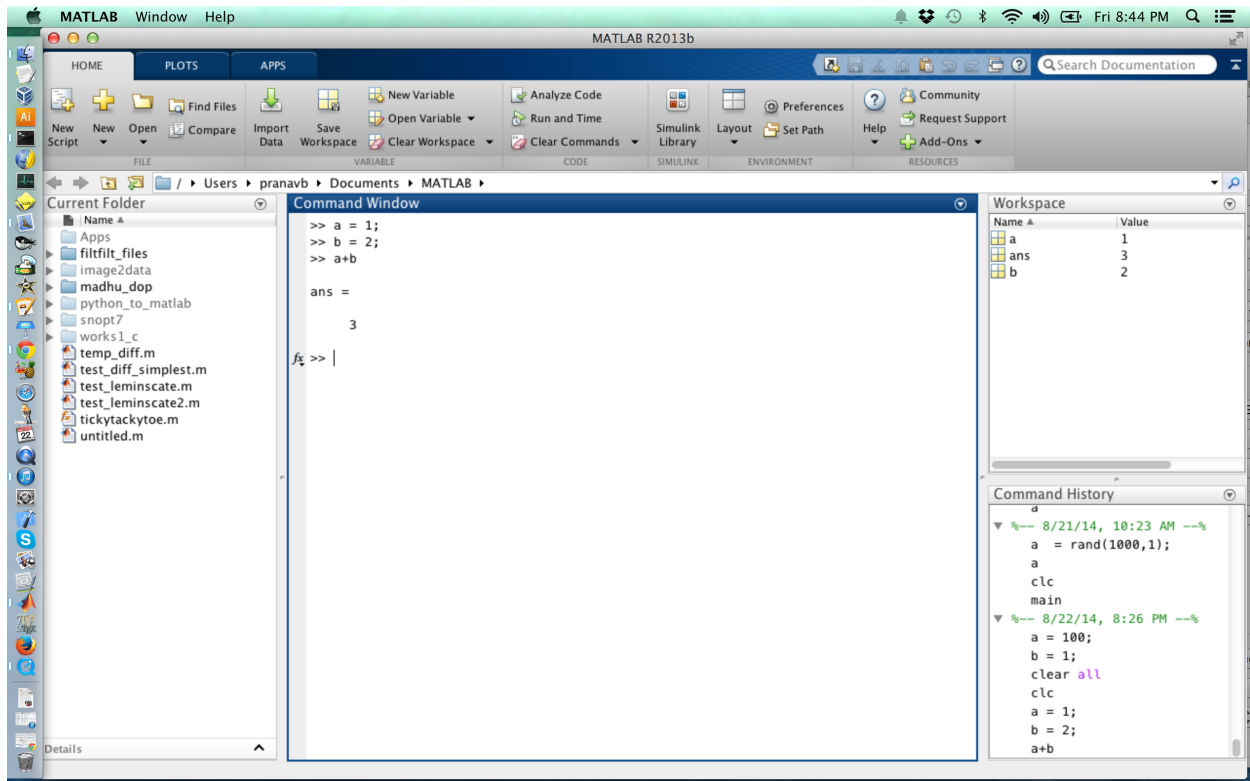
3. The different panels are marked below

Note the Command Window has the symbol >>. This is where you will type. After typing you press ENTER to register the command.

4. **Using MATLAB as a calculator**
```
>> a = 1;
>> b = 2;
>> a+b
```

The output is shown below.

NOTE a couple of things
I.   The variables in memory appear in the workspace. (Top right panel)
II.   The commands also appear in the Command History (Bottom right panel)
III. The sum a+b is printed as 3.
IV.   Putting a semi colon suppresses the output. For example, if we put a=1 then we would get something like a = 1 displayed on the next line. Try it out. Similarly if we have put a+b; then we would not have got the answer.
V.   We could also do something like
```
>> c = a+b;
>> c
```
This would lead to something like
```
>> c =
        3
```

From here on, I will only put things we type in the Command Window and the output.

5. **Vectors in different ways**

\>\> d = [1 2 3] %This is comment.

NOTES: Comments start with %. What you type after % is ignored by MATLAB. The above line produces the row matrix, i.e. one row and three column.

\>\> e = [1 2 3]'
This produces the column matrix, i.e. one column and three rows. The apostrophe here does the transpose of the matrix

Another way of writing the same matrix is
\>\> e = [1; 2; 3]

6. **All inputs to MATLAB are matrices**
One thing to note is that all variables entered in MATLAB are treated as matrices (hence the name MATrix LABoratory)

You can check the number of rows and columns by typing invoking the function size.

Try the following
\>\> size(a)
The answer will be 1 1, indicating this is a matrix with 1 row and 1 column.

Try these out.
\>\> size(d)
\>\> size(e)

7. **Using help in MATLAB**
If you need help on something just type help 'command name'

\>\> help size

8. **Generate random matrices.**
Let us generate a random matrix of size 3 by 3.

\>\> A = rand(3,3)
This tells MATLAB to generate a random matrix of size 3 by 3. For more info you can type help rand

If you want the element in Row 1 and Column 1 you need to type A(1,1). For the element in Row 1 and Column 2 you type A(1,2).

9. **Finding the inverse**
>> B = inv(A)

To check the result try
>>A*B
As you know A into its own inverse will give the identity matrix.

10. **Generating a list of numbers**
>> t = linspace(0,6,100);
This generates the matrix t with 1 row and 100 columns in the range from 0 to 6.

11. **Basic Plotting**
>> x = sin(t)
x is also going to be a matrix with 1 row and 100 columns.

>> plot(t,x)
This generates a plot of x as a function of t

>> xlabel('x'); ylabel('t')
This puts labels on the x and y axis.

>> You can customize the plot. For e.g. if you want the plot to have x instead of continuous line try
>> plot(t,x,'rx');
>> figure(1)

12. **Multiple Plots can be done using subplot.** Try these commands
>> subplot(2,1,1); plot(t,x,'rx');
>> subplot(2,1,2); plot(t,y,'bo');
>> figure(1)

13. **Extra (do later)**
You will learn best by playing with MATLAB. Try these commands
>>eye(3)
>>ones(4,2)
>> clc
>>zeros(2,3)
>> clear all
The last command will clear variables in the workspace (see 2nd figure in this workout to locate the Workspace).

To learn more about a function just type help <function_name> at the command prompt.