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Scripts and User-defined Functions with MATLAB

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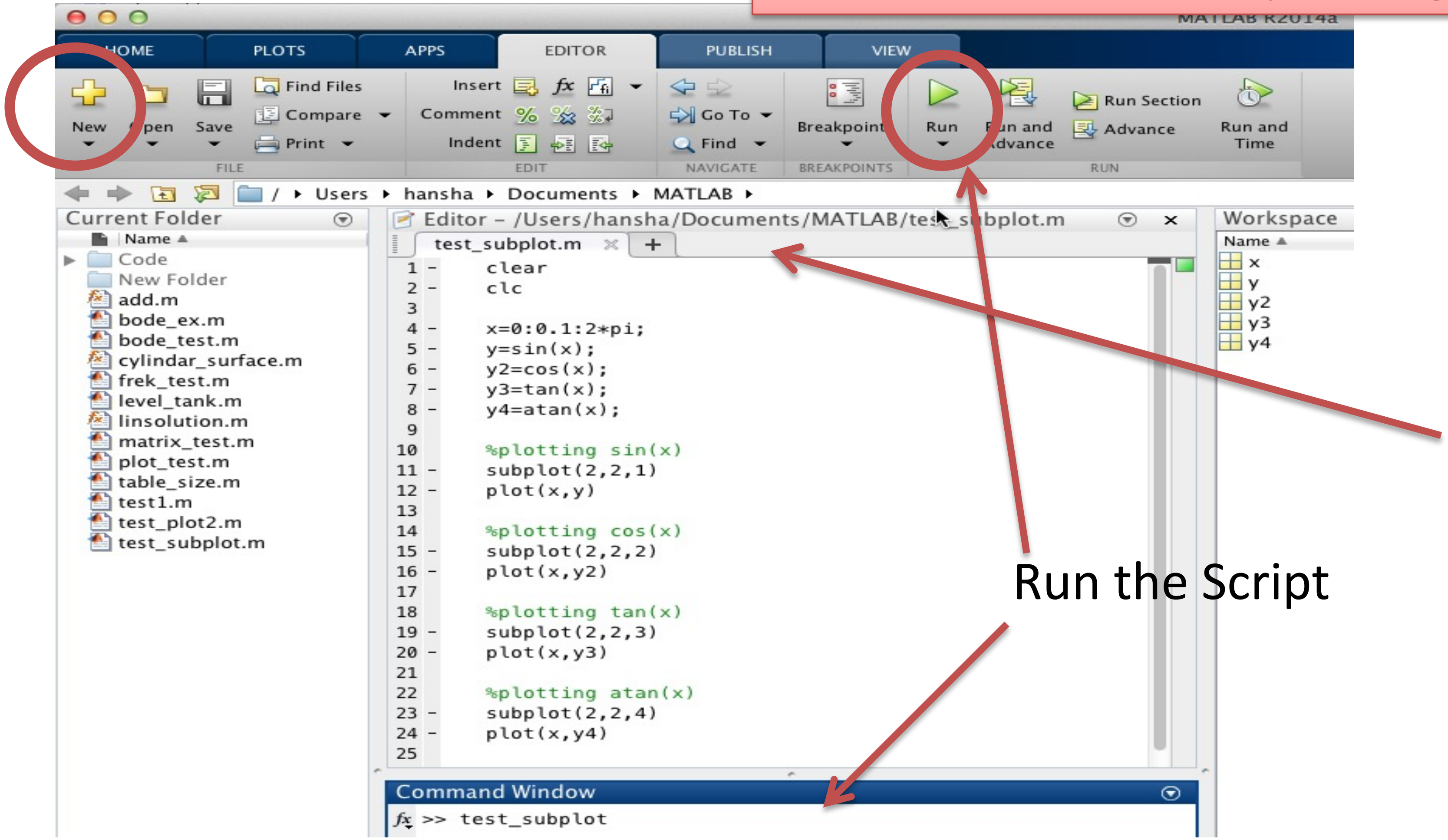
Scripts (m-files)

MATLAB Scripts are saved as so-called .m files (file extension is .m)

Script Editor

When using the Script Editor, you may create several lines of code and execute all in one batch. You can easily do changes in your code, create comments, etc.



```
clear
clc

x=0:0.1:2*pi;
y=sin(x);
y2=cos(x);
y3=tan(x);
y4=atan(x);

%plotting sin(x)
subplot(2,2,1)
plot(x,y)

%plotting cos(x)
subplot(2,2,2)
plot(x,y2)

%plotting tan(x)
subplot(2,2,3)
plot(x,y3)

%plotting atan(x)
subplot(2,2,4)
plot(x,y4)
```

```
>> test_subplot
```

Run the Script

```
clear
clc

x=0:0.1:2*pi;
y=sin(x);
y2=cos(x);
y3=tan(x);
y4=atan(x);

%plotting sin(x)
subplot(2,2,1)
plot(x,y)

%plotting cos(x)
subplot(2,2,2)
plot(x,y2)

%plotting tan(x)
subplot(2,2,3)
plot(x,y3)

%plotting atan(x)
subplot(2,2,4)
plot(x,y4)
```

Script (M-file)

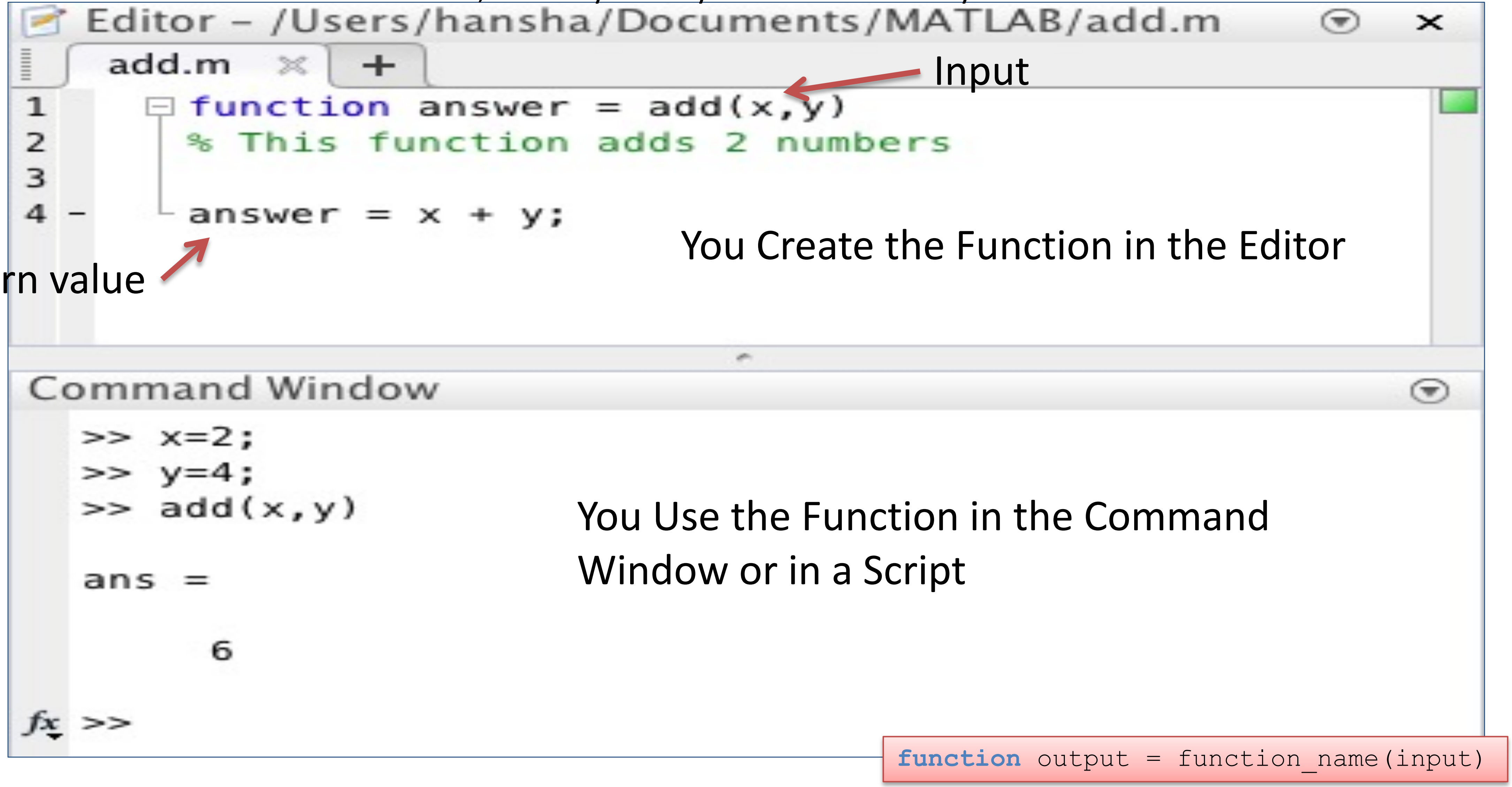
- Create a Script (M-file) where you create a vector with random data and find the average and the standard deviation
- Run the Script from the Command window.

```
x = rand(10, 1)

mean(x)

std(x)
```

```
x =     0.8147     0.9058
0.1270     0.9134
0.6324     0.0975
0.2785     0.5469
0.9575     0.9649


ans =     0.6239

ans =     0.3459
```

User-defined Functions

MATLAB contains hundreds of built-in functions, but very often you need to create your own functions



```
function answer = add(x,y)
% This function adds 2 numbers

answer = x + y;
```

Input

Return value

You Create the Function in the Editor

```
>> x=2;
>> y=4;
>> add(x,y)

ans =

     6

>>
```

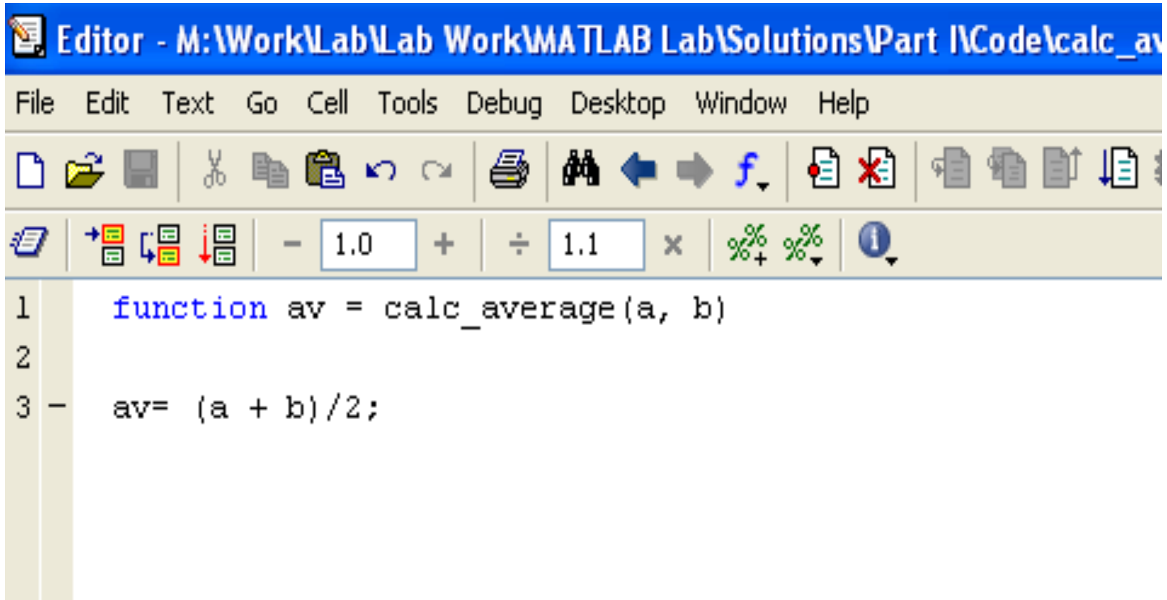
You Use the Function in the Command Window or in a Script

```
function output = function_name(input)
```

User-defined function

- Create a function **calc_average()** that finds the average of two numbers.
- Test the function afterwards in the Command window as follows:

```
>>x=2;
>>y=4;
>>z=calc_average(x,y)
```


Editor - M:\Work\Lab\Lab Work\MATLAB Lab\Solutions\Part I\Code\calc_av
File
Edit
Text
Go
Cell
Tools
Debug
Desktop
Window
Help
1.0
1.1

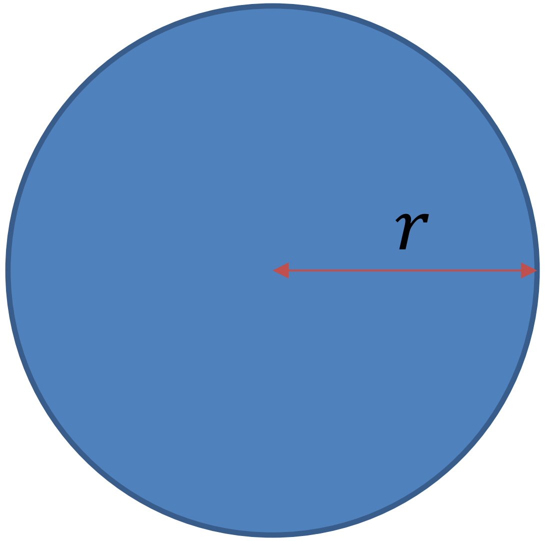
```
function av = calc_average(a, b)

av= (a + b)/2;
```

We test the function in the Command window

```
>>  z=calc_average(x,y)
z  =
         3
```

User-defined function II

- Create a function **circle** that finds the area in a circle based on the input parameter r (radius).
- Run and test the function in the Command window.



$$A = \pi r^2$$

We define the function:

```
function A = circle(r)

A=pi*r*r;
```

Testing the function from the Command window:

```
>> circle(1)
ans =
    3.1416
>> circle(2)
ans =
   12.5664
```

```
>> r=4;
>> A=circle(r)
A =
   50.2655
```

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