

# An Introduction to MATLAB

## Lesson 2: M-files

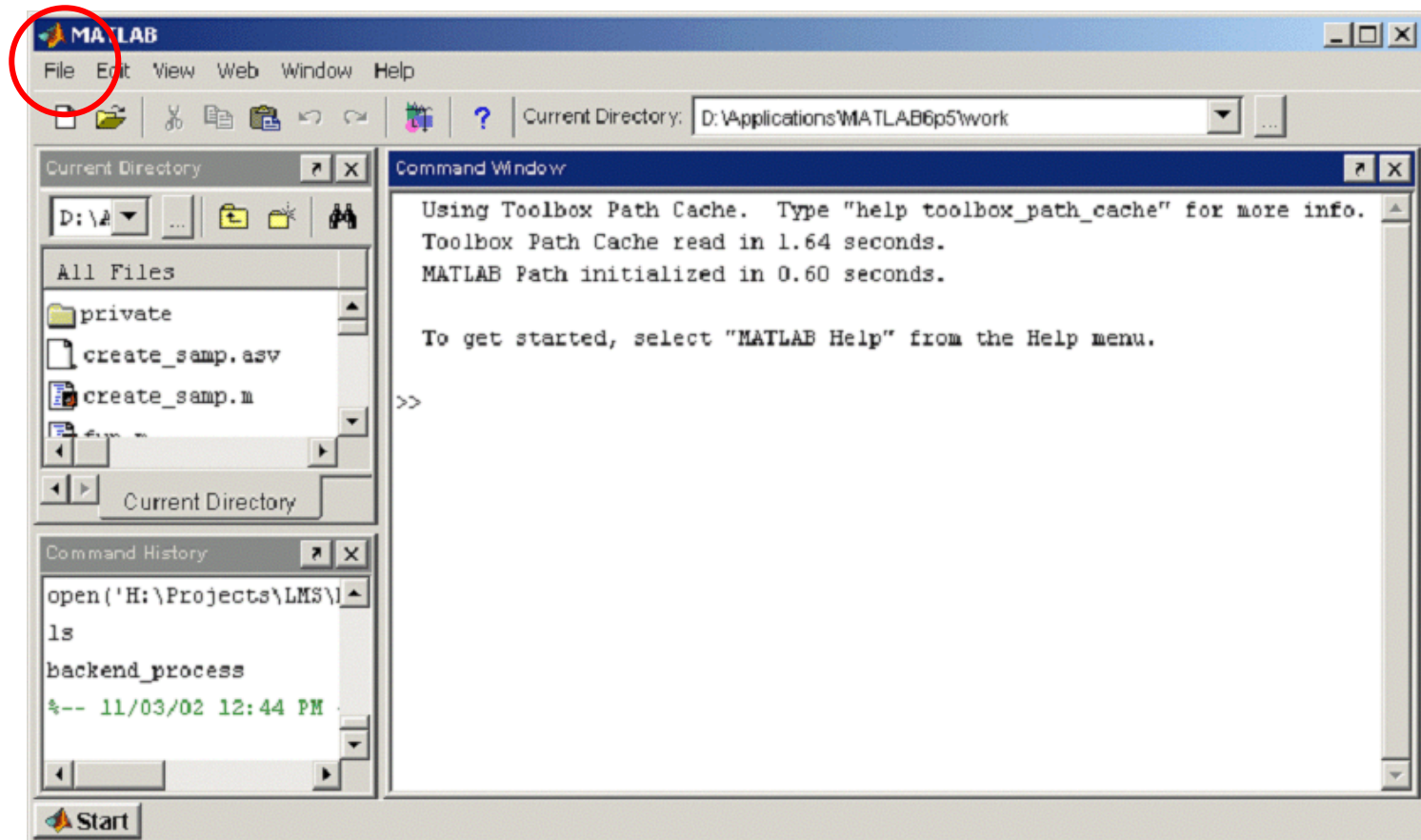
Dr. Samir Al-Amer  
Term 061

# Objectives

- To be able to create MATLAB m-files
- To understand the basics of **MATLAB files**
- **Basic graphics**

# Creating M-files

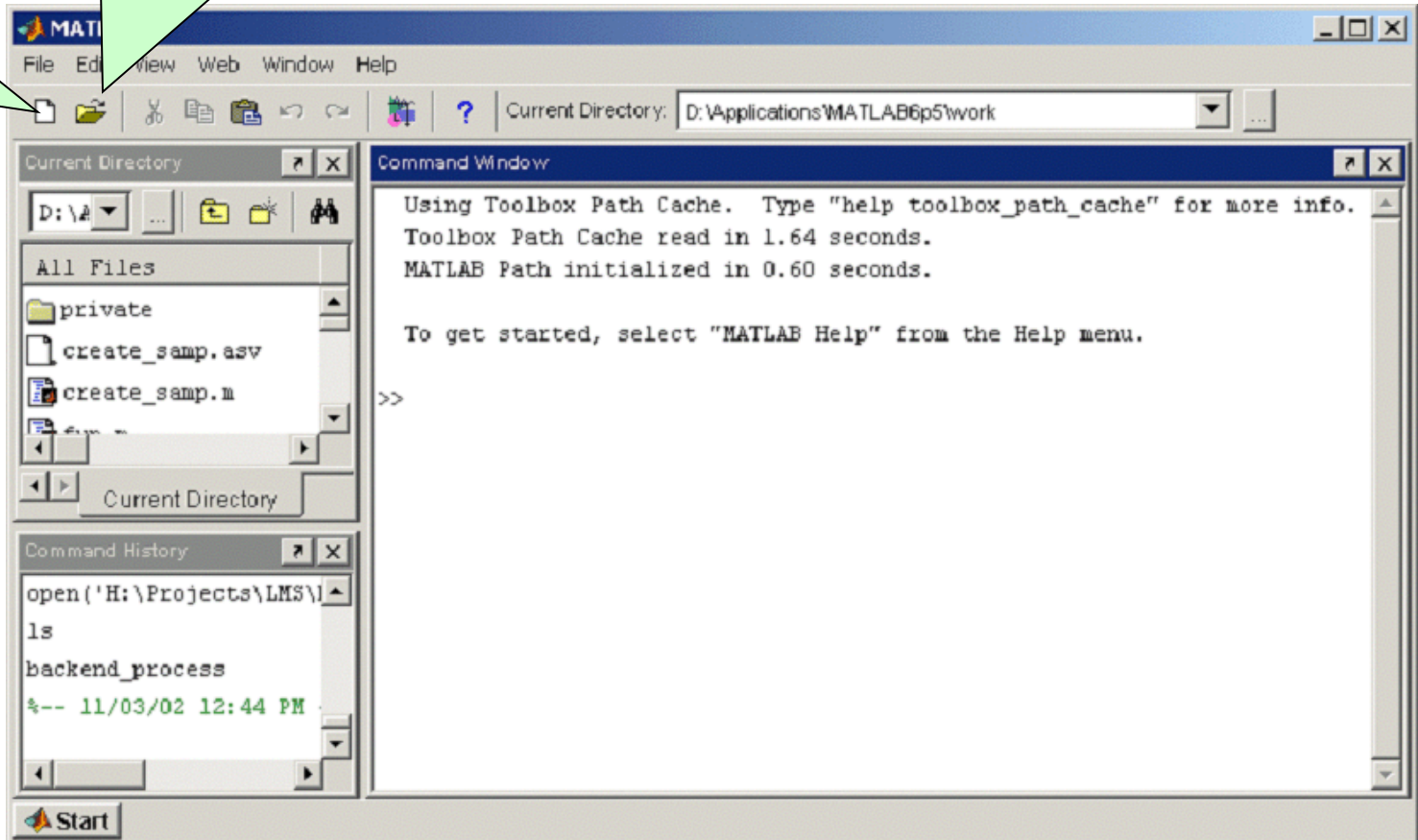
Select FILE → OPEN → NEW → M-files



# MATLAB shortcuts

Create a New file

Open an existing files



# Programming in MATLAB

- There are two types of MATLAB programs

## script files

```
% script file  
P=[1 3 2]  
roots(P)
```

## function files

```
function [y]=fun(x)  
y=x^2+3*x^2+2
```

# Script verses functions files

## Script files

- List of MATLAB statements
- Variables are global
- Run it by typing the file name

## Function files

- Starts with function
- List of MATLAB statements
- Variables are local

# Programming in MATLAB

## Script files

- Use script file when you have a long sequence of statements to solve a problem
- Run the program by
  - typing its name in the command window
  - from tools in the editor window

# Example 1

- Write a function file to compute the factorial of a number.
- Input: N
- Output :NF
- Function name: factorial



# A solution

output

Function name

input

First  
statement  
must start  
with  
'function'

```
function [FC]=factorial(N)
FC=1;
    for i=1:N
        FC=FC*i;
    end
```

Save the program using 'factorial' as a name

# Creating function file

Open an m-file and start typing the file

```
function [FC]=factorial(N)
FC=1;
    for i=1:N
        FC=FC*i;
    end
```

- Save the program using 'factorial' as a name
- If NOTEPAD is used to create the file use the name 'factorial.m'
- Save it in directory recognized by MATLAB
- If the directory is not recognized by MATLAB add it to the MATLAB path

# A Better one

These comments will be displayed when

'help factorial'  
is typed

```
function [FC]=factorial(N)
% [FC]=factorial(N)
% program to calculate the factorial of a number
% input N : an integer
% if N is not an integer the program obtains the
% factorial of the integer part of N
% output FC : the factorial of N

%
FC=1;           % initial value of FC
for i=1:N
    FC=FC*i;    % n! =(n-1)!*n
end
```

Comments are used to explain  
MATLAB statements

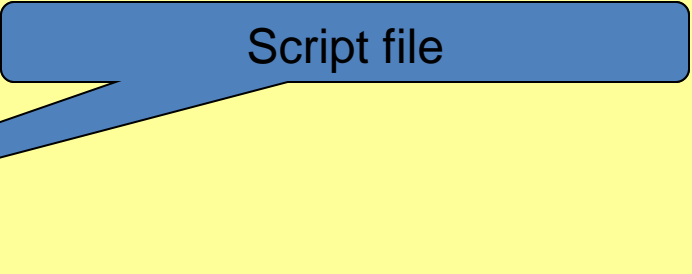
# Script file to compute factorial

```
% program to calculate the factorial of a number
% input N : an integer
% if N is not an integer the program obtains the
% factorial of the integer part of N
% output FC : the factorial of N
%
FC=1;           % initial value of FC
  for i=1:N
    FC=FC*i;    % n! =(n-1)!*n
  end
```

Comments are used to explain  
MATLAB statements

# Script file to compute cos

```
% program to calculate an estimate of cos(0.2)
% cos(x)  $\approx 1 - x^2/2! + x^4/4!$ 
x=0.2
Sum=1
N=2
fact2
Sum=Sum-x^2/FC
N=4
fact2
Sum=Sum+x^4/FC
```



Script file

# Graphics on MATLAB

- Simple 1D graphics
  - Linear scales
  - Semilog scale
  - Loglog scale
- 2D graphics

# Example

```
time=[0:0.01:6]
```

```
Y=sin(time)
```

Generating data

```
plot(time,Y)
```

Plot Y verses time x-axis is time  
y-axis is Y

```
xlabel('time')
```

Add a label to the x-axis

```
ylabel('sin(time)')
```

Add a label to the y-axis

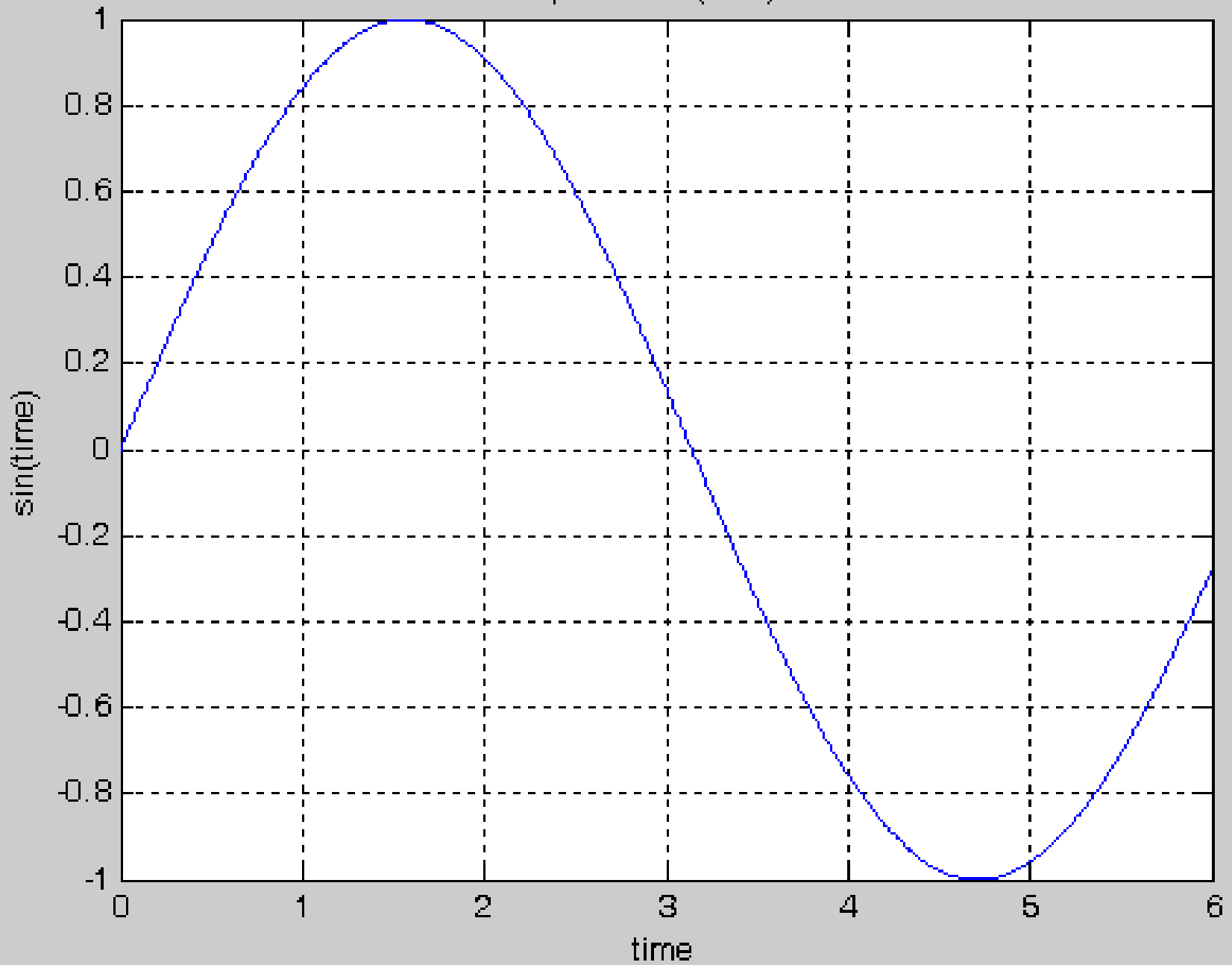
```
title(' plot of sin(time)')
```

Add a title

```
grid
```

Add grid lines

plot of  $\sin(\text{time})$





# Example

```
time=[0:0.01:6]
```

```
Y=sin(time)
```

Generating data

```
plot(time,Y)
```

Plot Y verses time x-  
axis is time  
y- axis is Y

You can add  
a label to the x- axis  
a label to the y- axis  
Title  
And others on the graph directly  
(click **insert**)

# Example

```
time=[0:0.01:6]
```

```
Y=sin(time)
```

```
plot(Y)
```

Generating data

Plot Y verses index  
x- axis is column #  
y- axis is Y

# Example

```
time=[0:0.01:6]
```

```
Y=sin(time)
```

Generating data

```
semilogx(time, Y)
```

Plot Y verses time  
x- axis is time (log scale)  
y- axis is Y (linear scale)

```
semilogy(t, Y)
```

Plot Y verses v  
x- axis is v (linear scale)  
y- axis is Y (log scale)

```
loglog(t, Y)
```

Plot Y verses v  
x- axis is v (log scale)  
y- axis is Y (log scale)

You can modify the scales directly on the figure

Click Edit → axis properties