



# *MATLAB for Finance*

## 9 Script and Function



# *M-files*

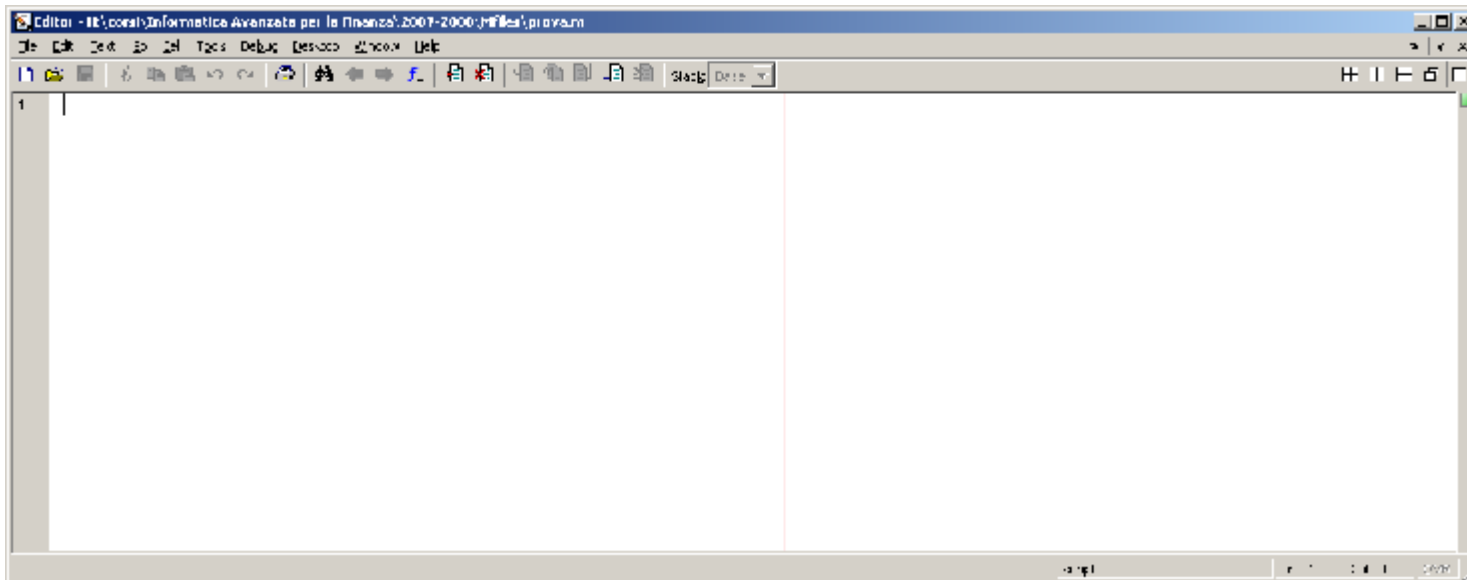
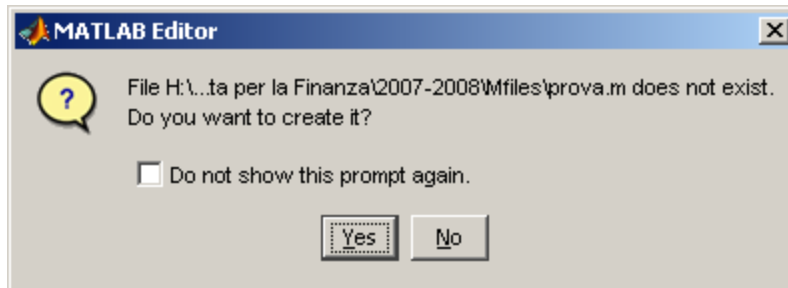
- ✱ MATLAB is not only an interactive environment but a powerful programming language also
- ✱ The MATLAB programs are saved in **M-files**
- ✱ M-files are text files (ASCII) and can be created with any kind of editor (notepad, edit). MATLAB contains a useful text editor
- ✱ M-files can be called and executed in the same way used for any other MATLAB command or function
- ✱ Commands and M-files with the same names are **overridden** and MATLAB runs the first matching name according to the search path



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# Creating M-file

edit prova.m





# Exercise

- ❁ Create an M-file to collect all the commands needed in the last exercise (*download DAI.DE historical first*):
  3. Create field "Dates" in "MB" structure converting date strings in serial numbers
  4. Create an array of cells with the column headers of imported data
  5. Add all the data to MB structure. The field names are given by the headers in 4
- ❁ Create a new M-file to:
  - ❏ Import downloaded data in MATLAB
  - ❏ and to recall the first M-file.



# Importing Data

✚ Import wizard can be replaced by:

▣ csvread or dlmread:

```
data = csvread(fname, row, col)
```

0 = first

```
data = dlmread(fname, ';' , row, col)
```

delimiter

▣ xlsread

```
[data descr raw] = xlsread(fname)
```



# *Script or function?*

- ✚ There are two kind of M-files:
  - ✚ **Scripts**, which do not accept input arguments or return output arguments. They operate on data in the workspace.
  - ✚ **Functions**, which can accept input arguments and return output arguments. Internal variables are local to the function.



# *Script*

- ✚ When you invoke a script, MATLAB simply executes the commands found in the file
- ✚ Scripts can operate on existing data in the workspace, or they can create new data on which to operate
- ✚ Although scripts do not return output arguments, any variables that they create remain in the workspace, to be used in subsequent computations



# Script

✚ Declaration (name of the file):

*nome.m*

✚ Implementation/Definition  
(contents of file *nome.m*):

*Statements*

✚ Execution

>> nome





# *Functions*

- ✚ Functions are M-files that can accept input arguments and return output arguments
- ✚ The names of the M-file and of the function should be the same
- ✚ Functions operate on variables within their own workspace, separate from the workspace you access at the MATLAB command prompt



# *Function: definition*

## MATHEMATICS

- ✿ A function is an equation for which any element of set  $A$  will yield exactly one element of set  $B$  out of the equation :

$$f: A \rightarrow B$$

## INFORMATICS

- ✿ An ordered list of statements defined once to be used many times, on different data if needed



# Function

- Declaration (name of the file):

*nome.m*

- Implementation/Definition:

**function** *variabile* = *nome* (*parametri*)

*Statements*

**end**

- Execution

*variabile* = *nome* (*parametri*) ;



# *Exercises*

✚ Create function `returns` that computes:

```
r = log(prices(2:end,:)) - log(prices(1:end-1,:))
```

✚ Create a function that computes the average of passed values



# Exercises

- ✚ Create a function that returns the positive elements of passed matrix
- ✚ Create a function that returns the cumulative product of a vector of 5 elements
- ✚ Create function  $f$ , `myf` in MATLAB, that makes the following computation:

$$f(x) = x^2 + 2$$