



# Course N°07

## Function file

### in MATLAB



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## 1. Definition

Functions are useful when a certain part of the code must be repeated many times or if we want make into a basic tool available for future use.

This section covers the following points concerning a **function M-file**; how to :

- ✓ Open or **create** a function
- ✓ Write a **name** of this function in MATLAB
- ✓ Select a **folder** to **save** the function in MATLAB
- ✓ Write **commands** and **operations** in function
- ✓ Run a function and **display** the result

## 2. Syntax

Functions in MATLAB are stored in separate files. Unless specifically declared as global, all variables are local, which means that they are valid only within that function. Think about a function as a ‘watertight’ piece of code. Its communication with the outside world are the input and the output variables.

The formal syntax for a function definition is :

**function [list\_of\_output\_arguments] = function\_name(list\_of\_input\_arguments)**

or

**function [y1,y2,...,yn] = function\_name(x1,x2,...,xn)**

**h** { % y1,y2,...,yn are the function's output variables

**e** { % x1,x2,...,xn are the function's input variables

**l** { %

**p** { %

## 3. Naming

A call to a function will look for a file with the function’s name in the MATLAB path. Therefore, it makes sense to set the file name and the function name to be the same. For example, if your function is called `draw_trapeze` but the file is named `trapeze.m`, MATLAB will not accept a call to `draw_trapeze`. It will, however, accept a call to `trapeze.m`, and will subsequently run file `trapeze` regardless of the name you have specified as the function declaration within the file (`draw_trapeze`).

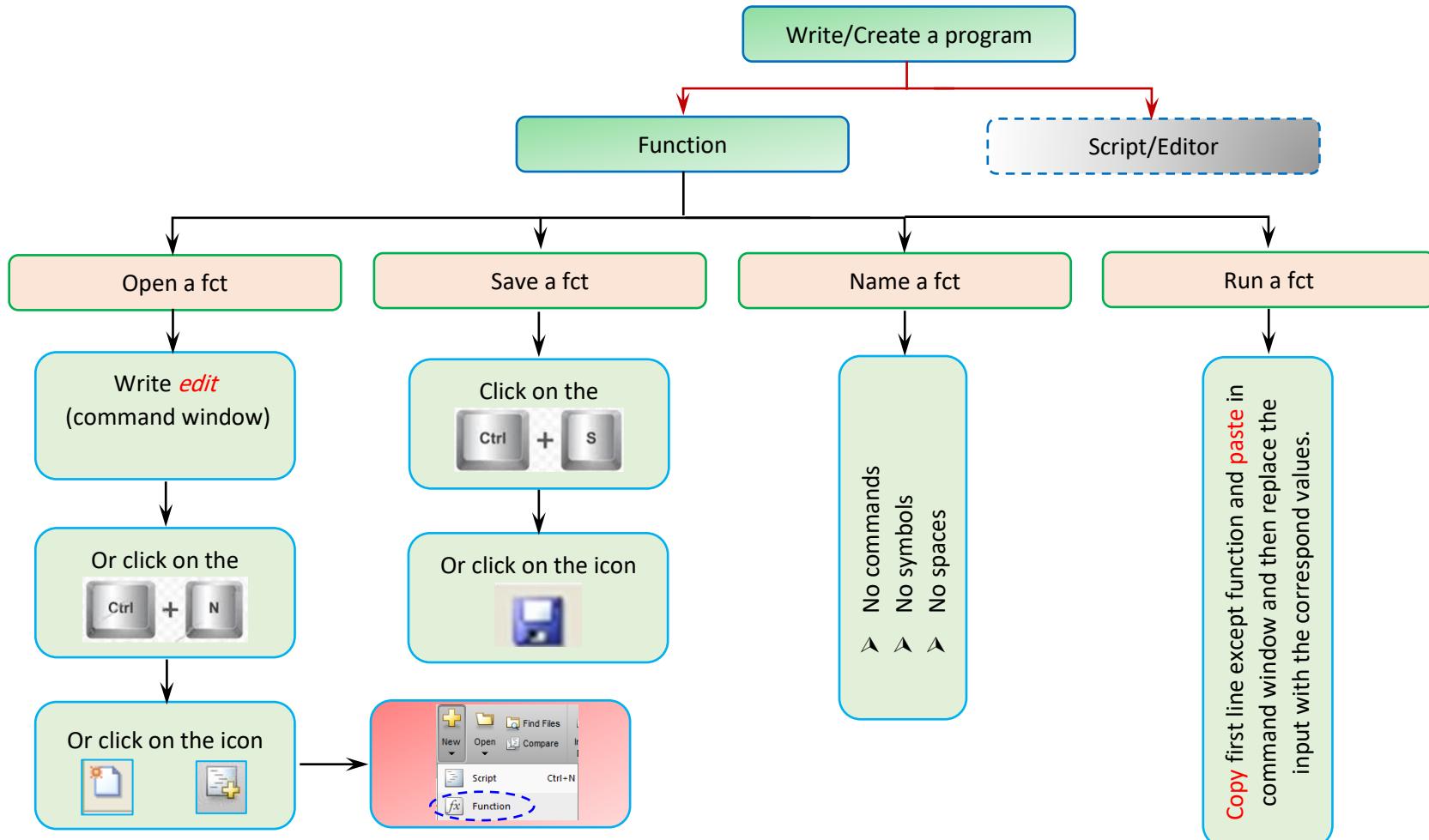


Fig 1. Summarizes the steps for writing a function in MATLAB



Some raccourci in keyboard

Raccourci clavier	Action
<b>Ctrl + F</b>	Recherche par mot clé (page Word, pdf, web...)
<b>Ctrl + A</b>	Sélectionne tous les éléments d'une page, d'un dossier.
<b>Ctrl + Z</b>	Annule la dernière action (si on le fait plusieurs fois, on annule plusieurs actions à rebours.)
<b>Ctrl + X</b>	Coupe un élément sélectionné (texte ou fichier)
<b>Ctrl + C</b>	Copie un élément sélectionné (texte ou fichier)
<b>Ctrl + V</b>	Colle l'élément que l'on vient de copier.
<b>Ctrl + roulette de la souris</b>	Zoomé ou « dézoomé » l'écran en cours.
<b>Ctrl + clic gauche souris</b>	Permet de sélectionner uniquement les objets que l'on clique donc non forcément contigus : mots fichiers
D'autres raccourcis qui peuvent servir...	
<b>Ctrl + B</b>	Mettre le texte sélectionné en Gras
<b>Ctrl + E</b>	Centrer le texte sélectionné
<b>Ctrl + I</b>	Mettre en italique le texte sélectionné
<b>Ctrl + U</b>	Souligner le texte sélectionné
<b>Ctrl + P</b>	Ouvrir la fenêtre pour imprimer
<b>Ctrl + S</b>	Enregistrer le document en cours



```

MATLAB R2014a
HOME PLOTS APPS EDITOR PUBLISH VIEW
New Script New Open Compare Import Data Save Workspace New Variable Open Variable Run and Time Preferences Community SIMULINK Layout Set Path Help Request Support
FILE Current Folder Editor - Untitled4*
1 function [ output_args ] = Untitled4( input_args )
2 %UNTITLED4 Summary of this function goes here
3 % Detailed explanation goes here
4
5 end
6
7
8
Command Window
p =
16.00
fx >>

```

Function must be the first word in first line

Fig 2. Syntax of a function in MATLAB

```

MATLAB R2014a
HOME PLOTS APPS EDITOR PUBLISH VIEW
New Script New Open Compare Import Data Save Workspace New Variable Open Variable Run and Time Preferences Community SIMULINK Layout Set Path Help Request Support
FILE Current Folder Editor - Untitled4*
1 function [ output_args ] = Untitled4( input_args )
2 %UNTITLED4 Summary of this function goes here
3 % Detailed explanation goes here
4
5 end
6
7
8
Command Window
p =
16.00
fx >>

```

The outputs must be between brackets

The inputs must be between parenthesis

Fig 3. The inputs and outputs of a function in MATLAB



The screenshot shows the MATLAB R2014a interface. In the Editor tab, there is a code editor window titled 'Untitled4'. The code defines a function:

```

function [ output_args ] = Untitled4( input_args )
%UNTITLED4 Summary of this function goes here
% Detailed explanation goes here
end

```

A red arrow points from the text 'The name of the function should be the same in the M-file' to the function name 'Untitled4' in the code.

In the Command Window below, the variable 'p' is assigned the value 16.00.

**Fig 4. Write the name of the function**

The screenshot shows the MATLAB R2014a interface. In the Editor tab, there is a code editor window titled 'Untitled4'. The code defines a function:

```

function [ s,p ] = areas( a,b )
s = a * b ;
p = 2*a*b ;
end

```

A red arrow points from the text 'Save icon or use Ctrl + s' to the 'Save' icon in the toolbar.

**Fig 5. Save icon in function MATLAB**

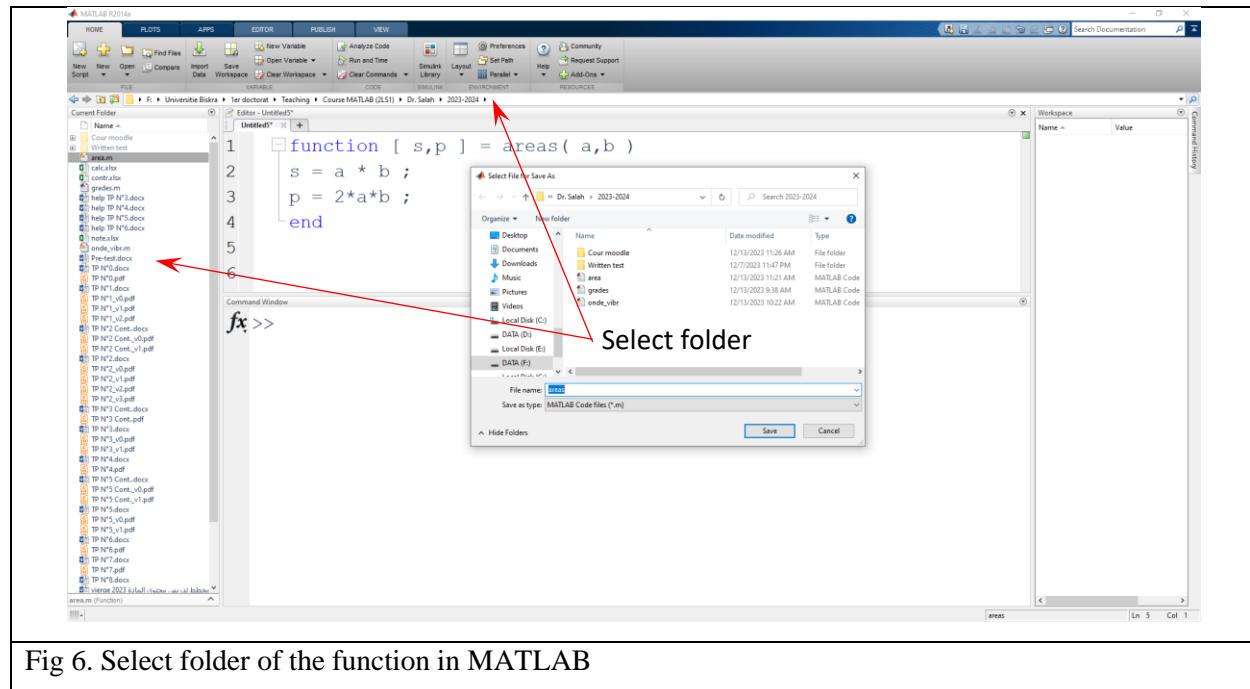


Fig 6. Select folder of the function in MATLAB

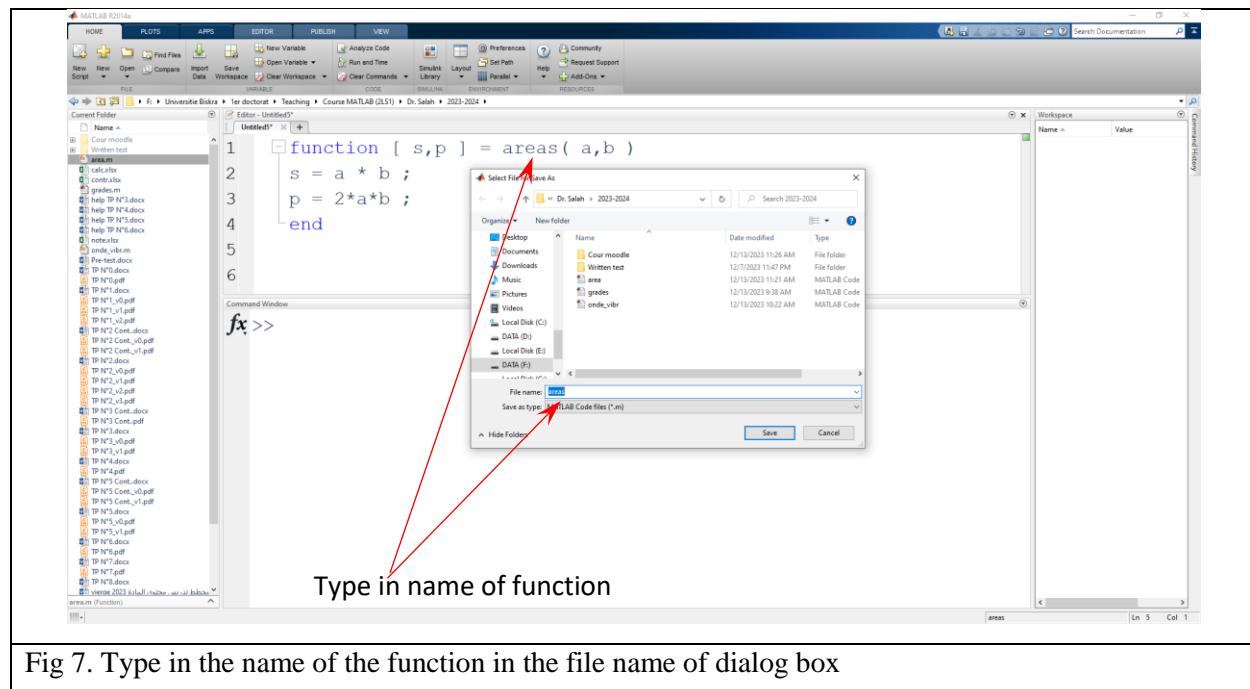


Fig 7. Type in the name of the function in the file name of dialog box



Copy the first line except function and hen paste in command window

```
fx >> [ s,p ] = areas( 4,2 )
```

Fig 8. Run or execute the function file in MATLAB

Replace the inputs with the values to be calculated and push enter to execute the commands

```
fx >> [ s,p ] = areas( 4,2 )
```

Fig 9. Run or execute the function file in MATLAB



The screenshot shows the MATLAB interface with the following details:

- Editor:** The code in `areas.m` is displayed:
 

```
function [ s,p ] = areas( a,b )
s = a * b;
p = 2*a+b;
end
```
- Command Window:** The output of the function call `[s,p] = areas( 4,2 )` is shown:
 

```
>> [s,p] = areas( 4,2 )
s =
8.00
p =
16.00
fx >> |
```
- Workspace:** A table showing variables and their values:
 

Name	Value
s	16
p	8

A red arrow points from the text "The outputs of the function after entered the inputs values" to the output in the Command Window.

Fig 10. The result after execute the function file in MATLAB

#### Note.

- ❖ MATLAB has a **template** for writing a **function M-file**.
- ❖ The first **executable statement** in the **function** file must **start** with the word **function**.
- ❖ If the function has **more than one output value**, then the **output variables** must be in **brackets**.
- ❖ If there is **only one output value**, then **no brackets** are **necessary**.
- ❖ If there are **no output values**, use **empty brackets**.
- ❖ The **input** and **output** arguments in the function may be **either scalar, vectors, and matrices**.

#### 4.List of References

Kattan, Peter Issa. *Matlab for Beginners: A gentle approach*. Petra books, 2008.

Etter, Delores M., David C. Kuncicky, and Douglas W. Hull. *Introduction to MATLAB*. Vol.4. Hoboken, NJ, USA: Prentice Hall, 2002.

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*Butt, Rizwan. Introduction to numerical analysis using MATLAB. Laxmi Publications, Ltd., 2008.*

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