SIS Scuola Interdipartimentale delle **Scienze**, dell'**Ingegneria** e della **Salute**

DiST Dipartimento di Scienze e Tecnologie

Laurea Magistrale in IA (ML&BD)

Scientific Computing (part 2 – 6 credits)

prof. Mariarosaria Rizzardi

Centro Direzionale di Napoli – Bldg. C4
room: n. 423 – North Side, 4th floor
phone: 081 547 6545
email: mariarosaria.rizzardi@uniparthenope.it

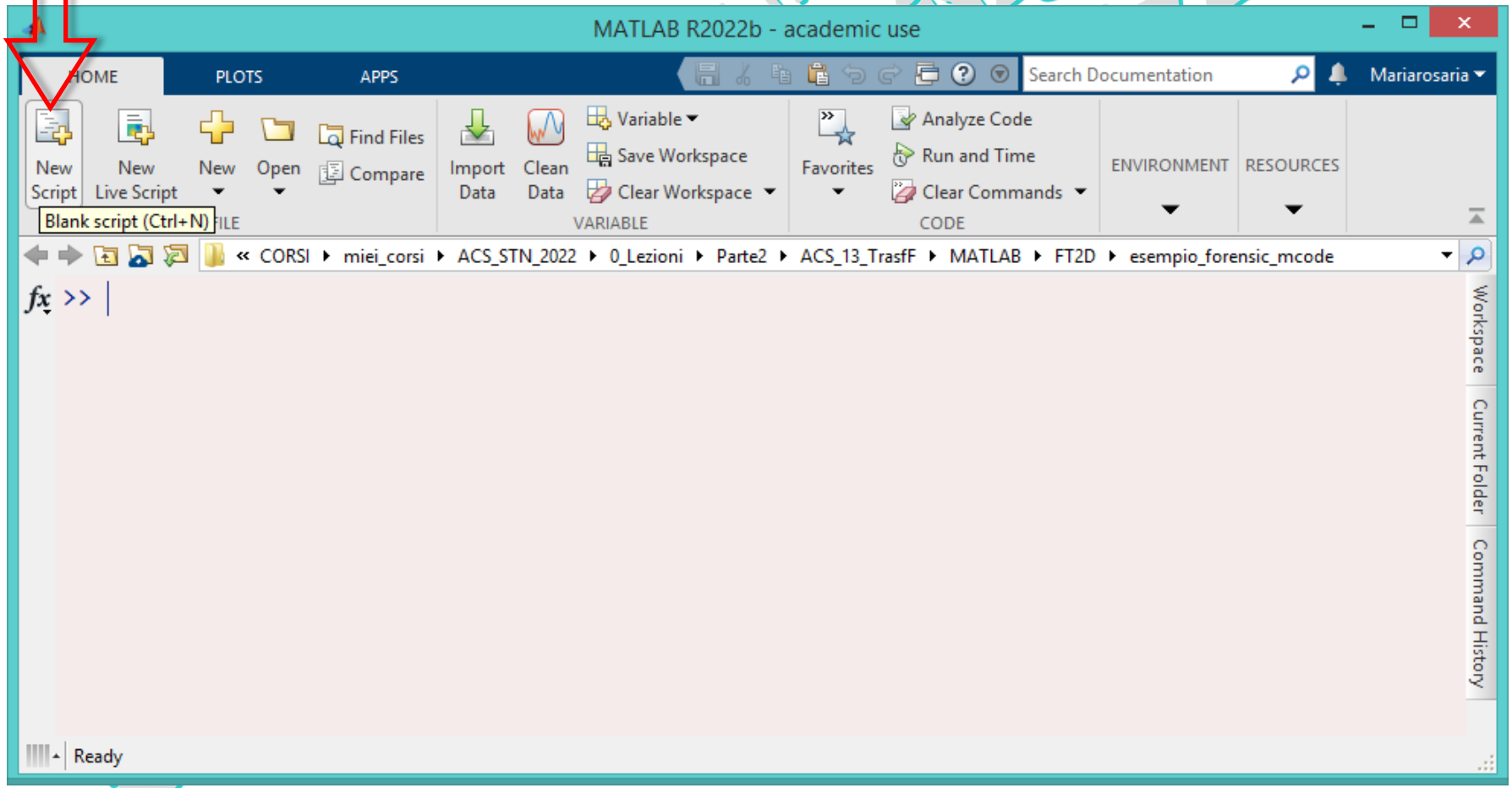
Contents

- Recap: the MATLAB Editor (m-file).
- Advanced use of the MATLAB Live Editor (mlx-file).

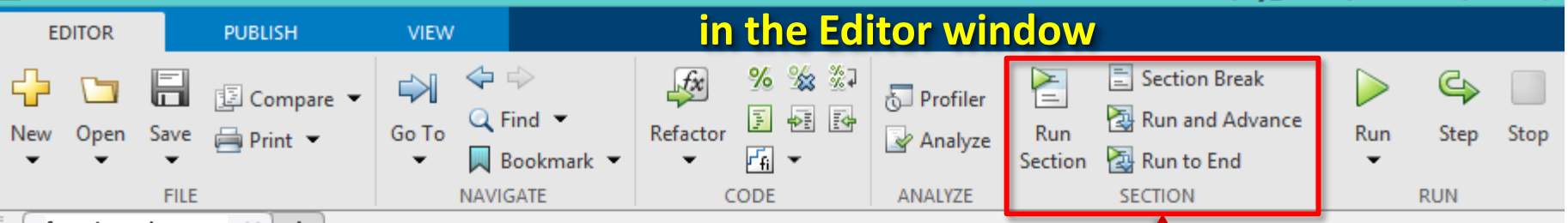
MATLAB Editor

We want to write a MATLAB program (m file) to display the plot of a function $y=f(x)$ in an interval.

In the Command Window select:



in the Editor window



function_plot.m

file name: an '*' denotes that the file has not been saved

download the script: **function_plot.m**

```
1
2   clear; clc
3
4   %% input data
5   N=input('Enter the number of points:                N = ');
6   a=input('Enter the left endpoint of the interval:   a = ');
7   b=input('Enter the right endpoint of the interval:  b = ');
8
9   %%
10  fstr=input('Enter the function to be evaluated: f(t) = ','s');
11  pf=['@(t)' fstr]; add @(t) before the string to form an anonymous function
12  pf=str2func(pf); % construct function handle from character vector
13      convert the string to anonymous function
14  %% display
15  x=linspace(a,b,N)';
16  y=pf(x);
17
18  figure(1); clf
19  plot(x,y)
20  set(gca,'FontSize',14)
21  xlabel('x'); ylabel('y')
22  title(['Plotted function: f(t) = ' fstr],'FontWeight','normal')
23
```

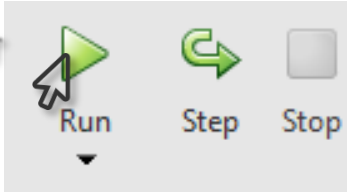
%% identifies a section of code

input a string

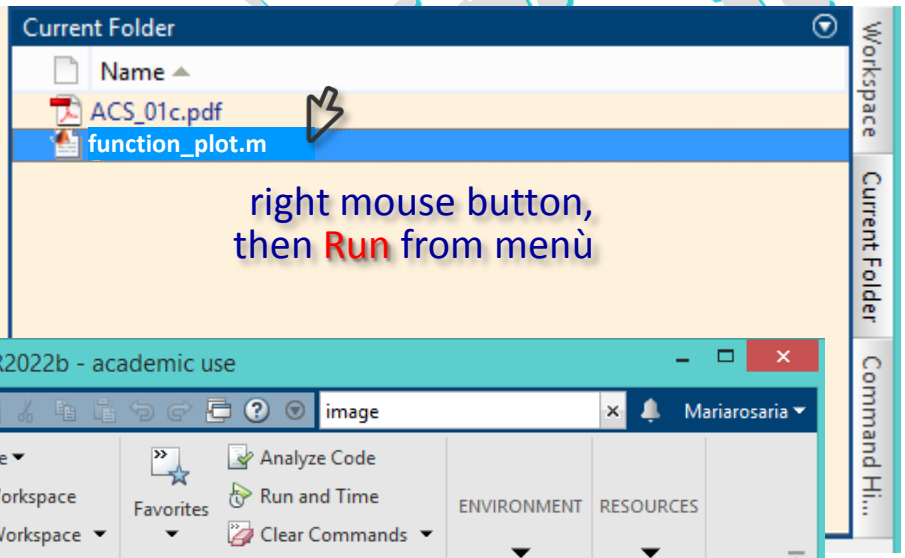
MATLAB Editor

To execute the script: `function_plot.m`

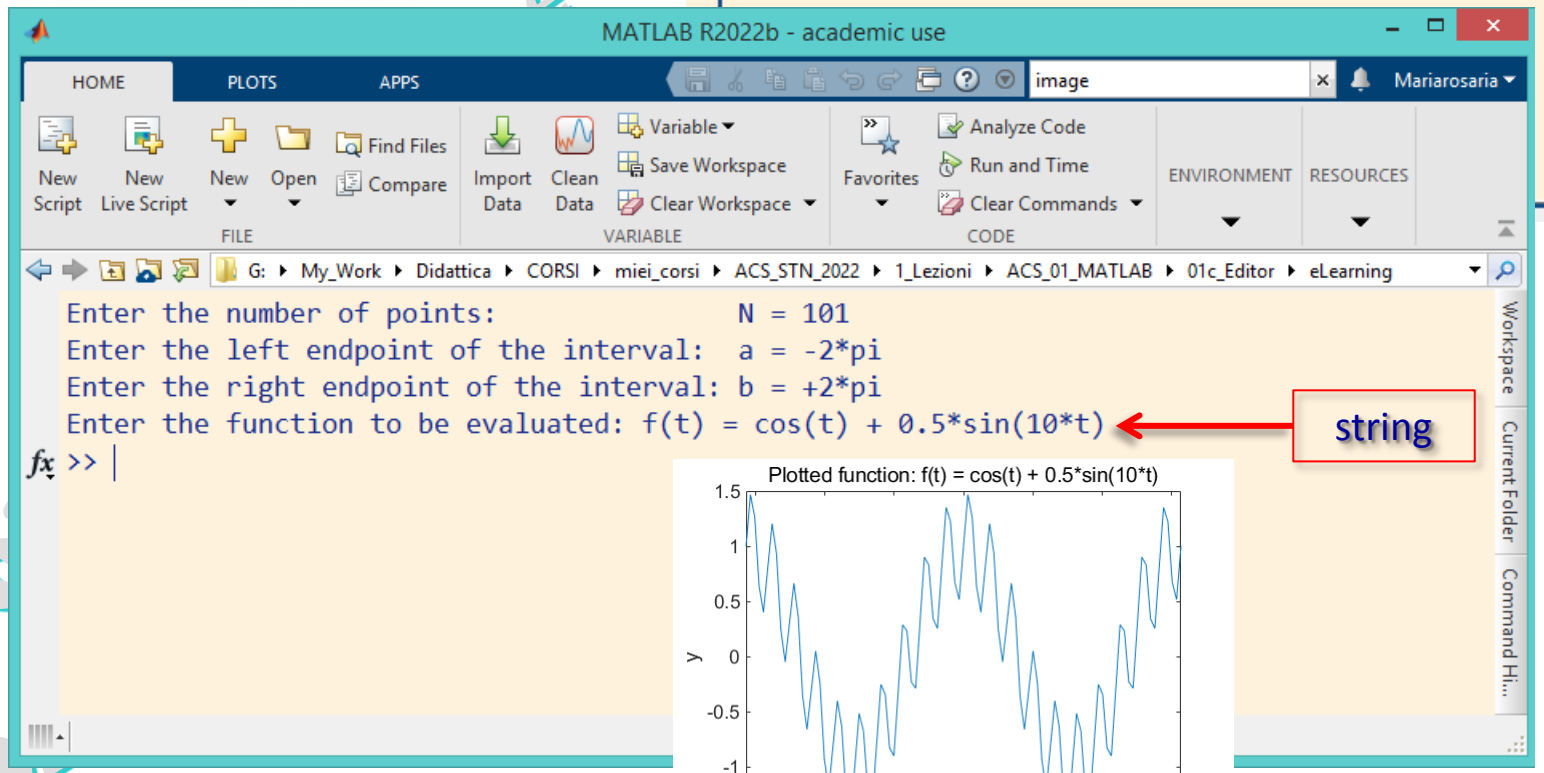
In the Editor window



In Current Folder



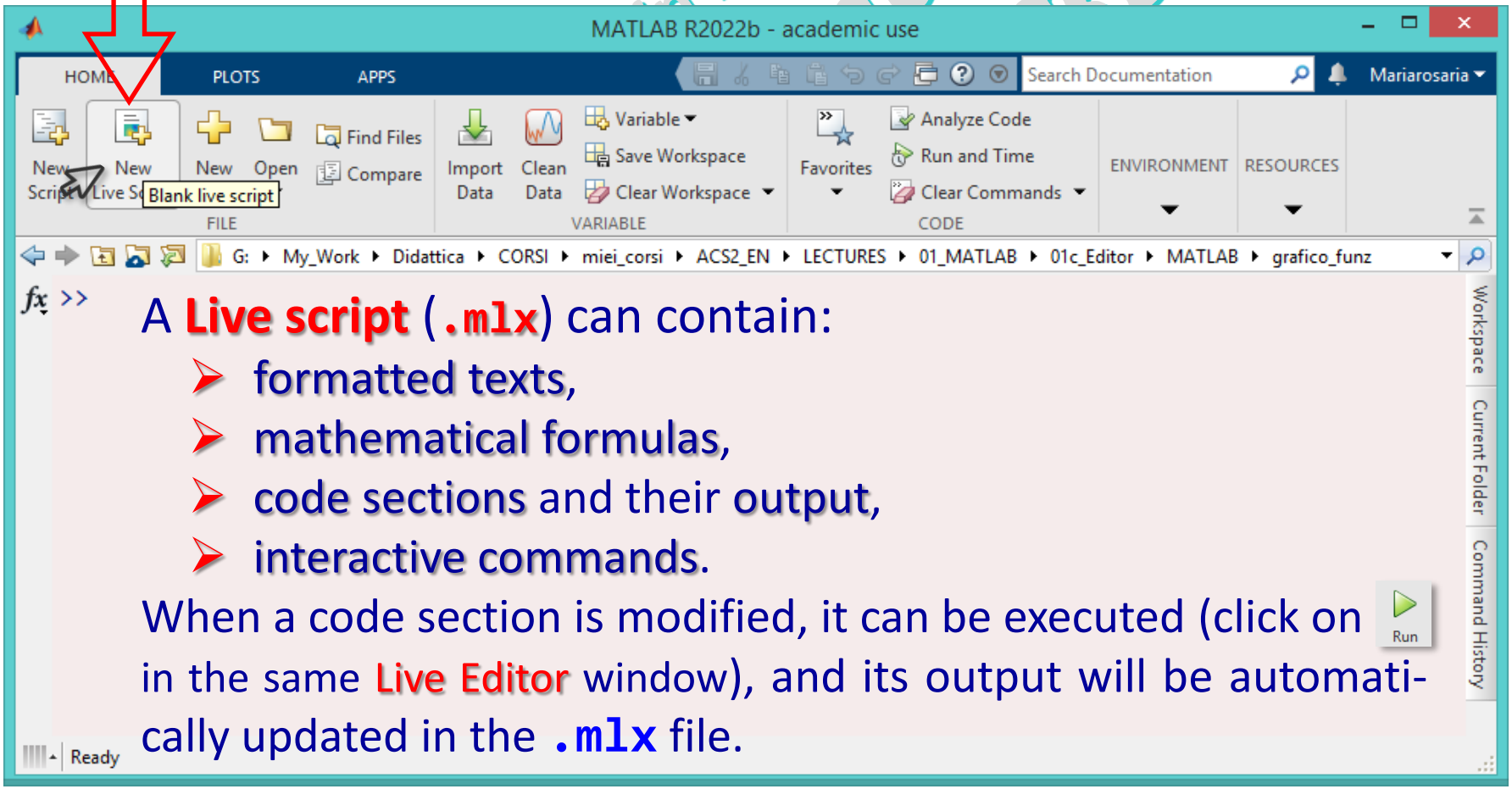
Then in the Command Window



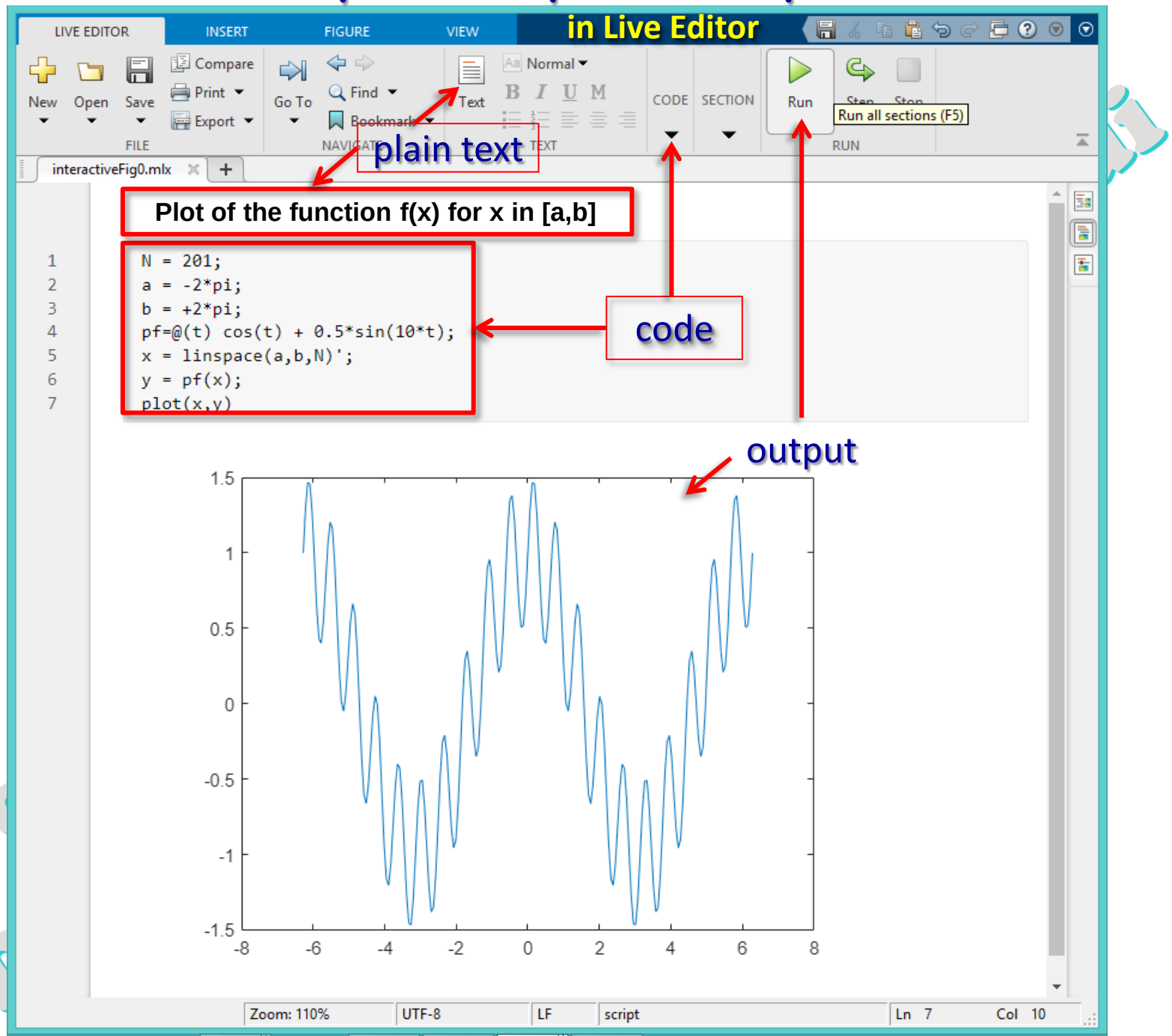
MATLAB Live Editor

We want to write a MATLAB program to display the plot of a function $y=f(x)$ in an interval, using the **Live Editor** with the addition of interactive commands.

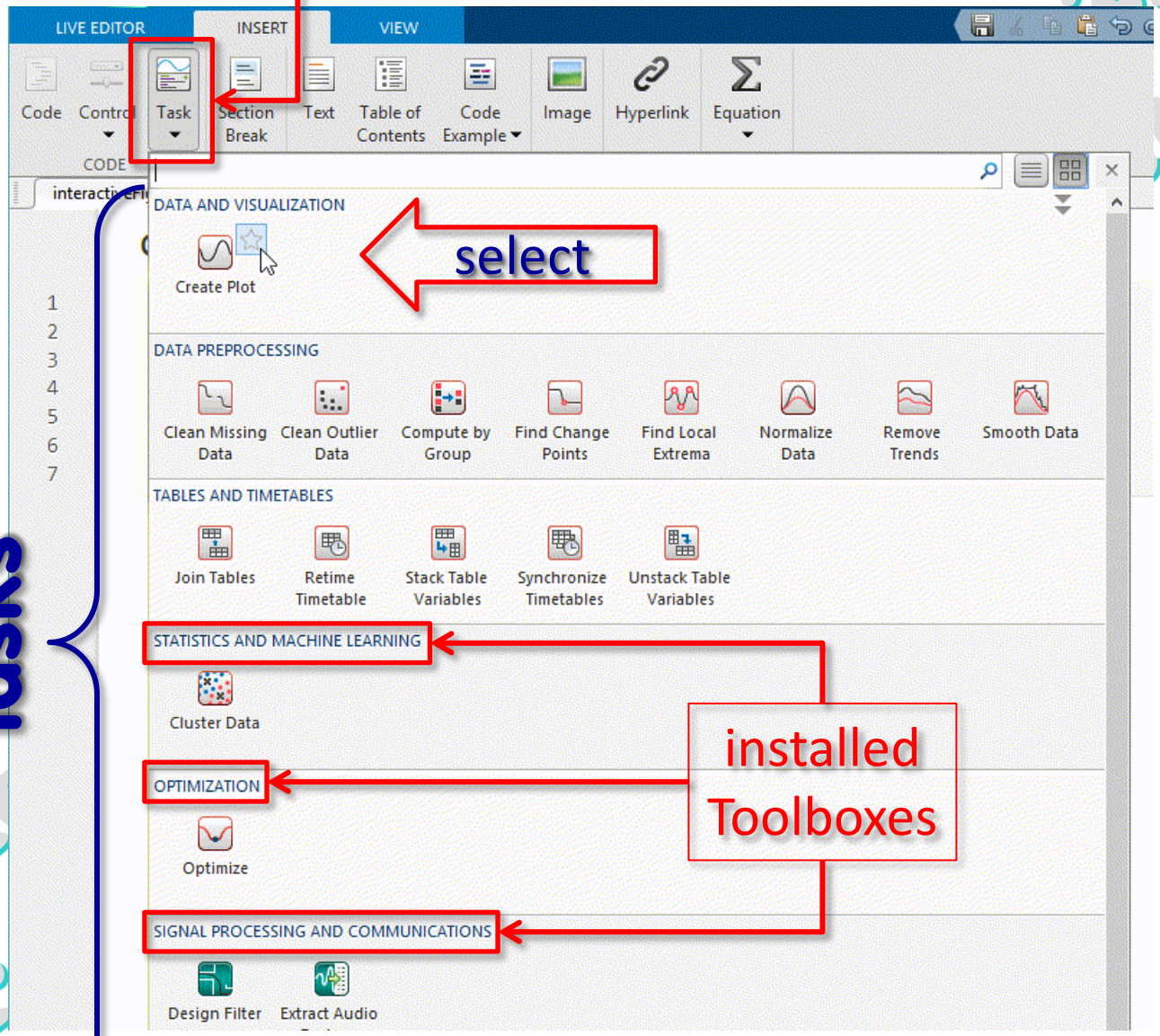
In Command Window select:



Example of a simple "Live Script"



In the Live Editor, instead of writing code to display the plot, we can insert a Task



```
4  pf=@(t) cos(t) + 0.5*sin(10*t);
5  x = linspace(a,b,N)';
6  y = pf(x);
7  %plot(x,y
```

Task: Create Plot

Create Plot

h3 = **plot** of x and y

Select visualization

Search for a visualization | Filter by Category: All

plot | bar | barh | histogram | contour | semilogy | semilogx | stem | mesh | loglog | quiver

Creates a 2-D line plot of the data in Y versus the corresponding values in X

Select data

X: x

Y: y

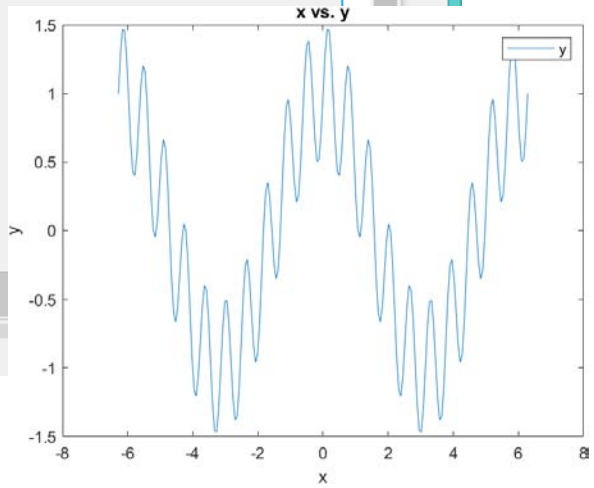
fill in the form fields

Select optional visualization parameters

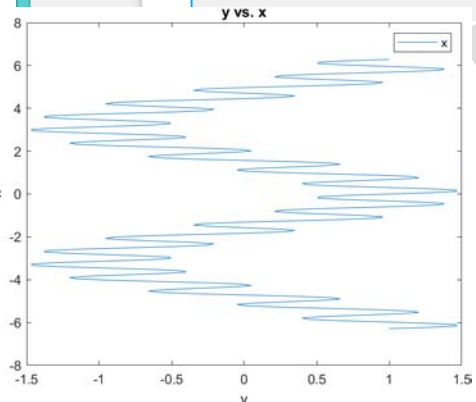
select

plot | Add

output



switch to display or hide the code



output

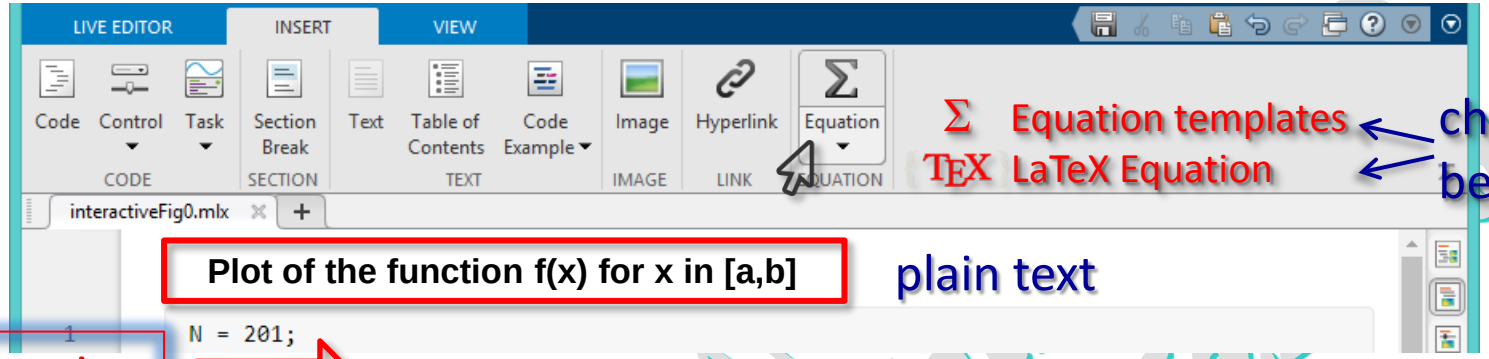
Select data

X: y

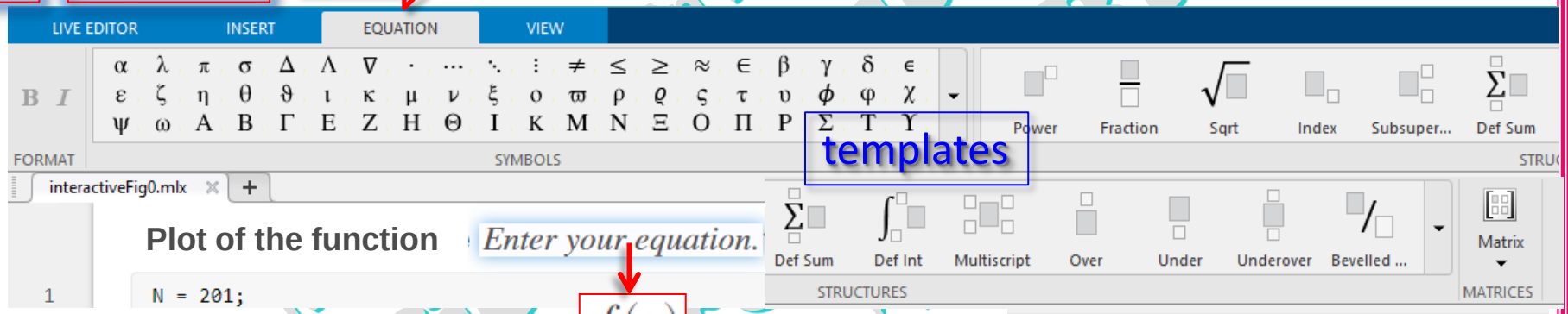
Y: x

select

A Live Script can contain math formulas in the text

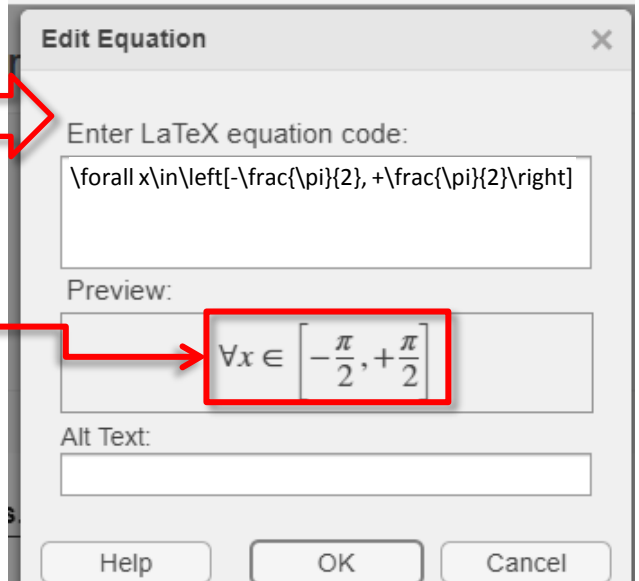


1 Equation



$f(x)$

2 LaTeX



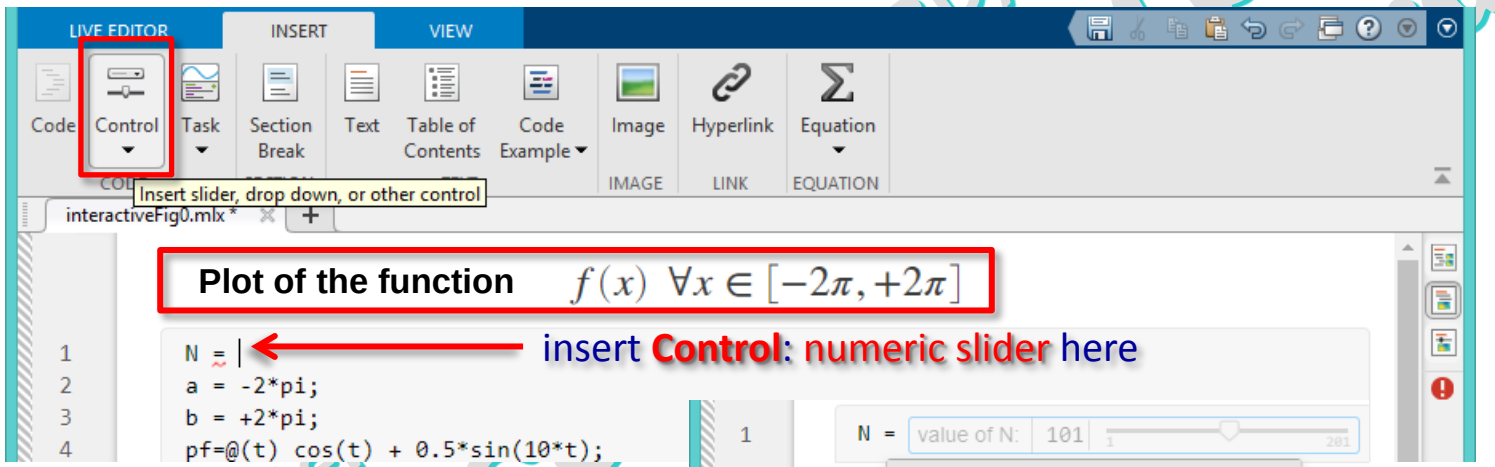
result

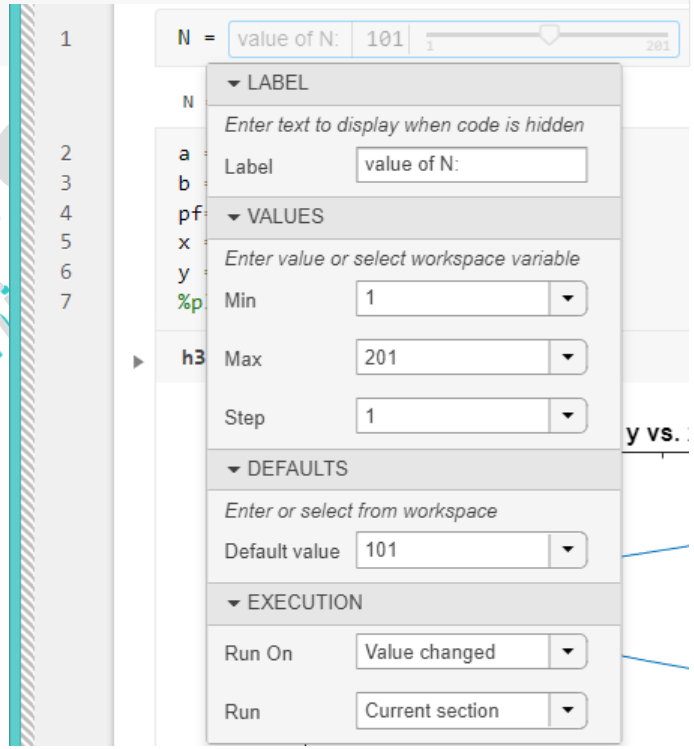
LaTeX* (pronounced latek) is a software system for publishing documents. It is a WYSIWYM (What You See Is What You Mean) *markup language*, unlike Word which is WYSIWYG (What You See Is What You Get).

* LaTeX: short for Lamport's TeX, named after Leslie Lamport who in 1994 added a library of macros to TeX (from the Greek τεχ=technology and art), the typesetting system created by Donald Knuth in 1978.

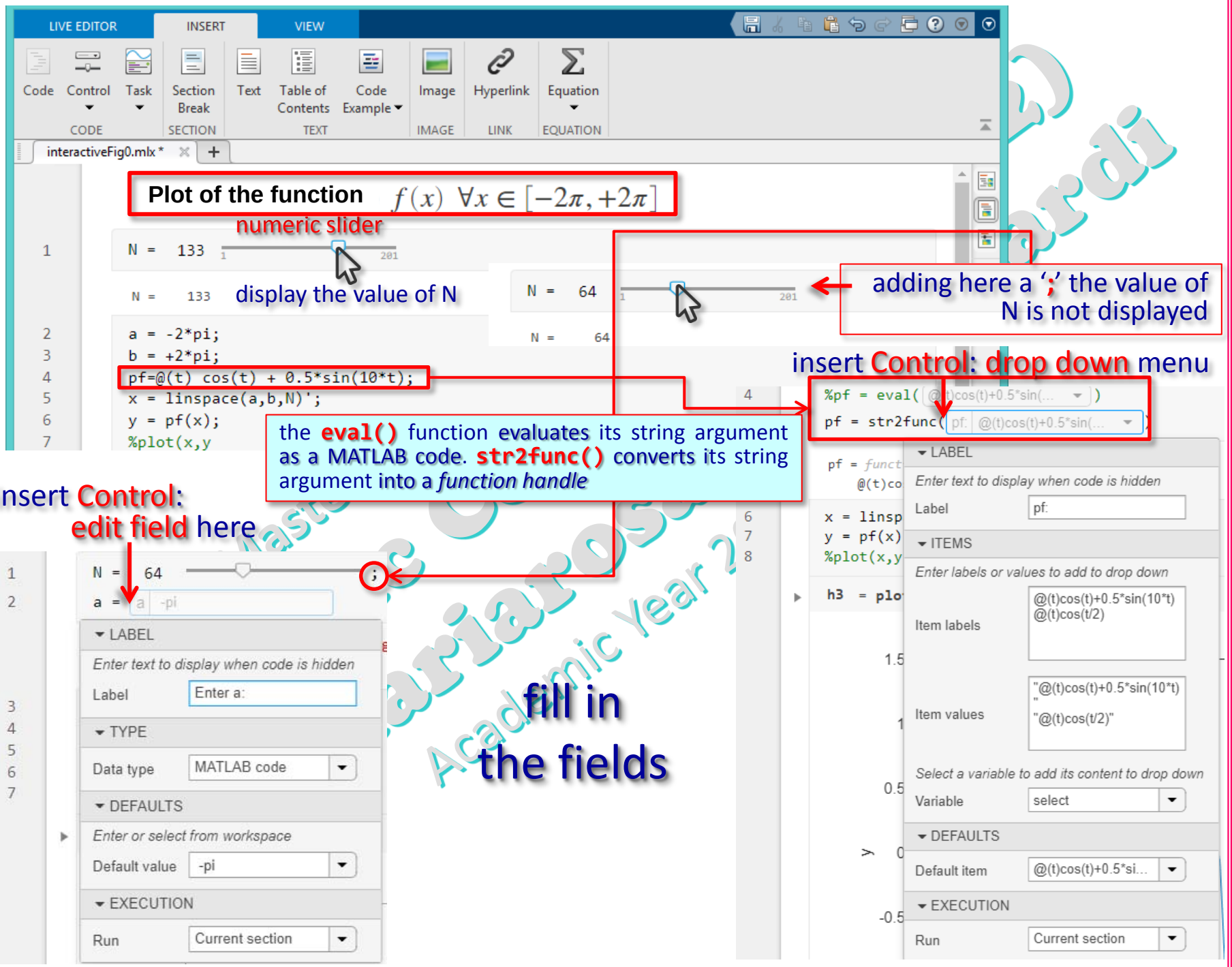
download: LaTeX_GreekLetters_SpecialCharacters_MATLAB.pdf, 1994_LaTeX_UserGuide_ReferenceManual.pdf, ...

We want to write a MATLAB program to display the plot of a function $y=f(x)$ in an interval, using the **Live Editor** with the addition of interactive commands (Control).





fill in the fields


LIVE EDITOR
INSERT
VIEW
Code
Control
Task
Section Break
Text
Table of Contents
Code Example
Image
Hyperlink
Equation
CODE
SECTION
TEXT
IMAGE
LINK
EQUATION
interactiveFig0.mlx *
Plot of the function $f(x)\ \forall x \in [-2\pi, +2\pi]$
numeric slider
N = 133
display the value of N
N = 64
adding here a ';' the value of N is not displayed
a = -2*pi;
b = +2*pi;
pf=@(t) cos(t) + 0.5*sin(10*t);
x = linspace(a,b,N)';
y = pf(x);
%plot(x,y
insert Control: drop down menu
%pf = eval(
pf = str2func(
the eval() function evaluates its string argument as a MATLAB code. str2func() converts its string argument into a function handle
insert Control: edit field here
N = 64
a = -pi
LABEL
Enter text to display when code is hidden
Label
Enter a:
TYPE
Data type
MATLAB code
DEFAULTS
Enter or select from workspace
Default value
-pi
EXECUTION
Run
Current section
ITEMS
Enter labels or values to add to drop down
Item labels
@(t)cos(t)+0.5*sin(10*t)
@(t)cos(t/2)
Item values
"@(t)cos(t)+0.5*sin(10*t)"
"@(t)cos(t/2)"
Select a variable to add its content to drop down
Variable
select
Default item
fill in the fields