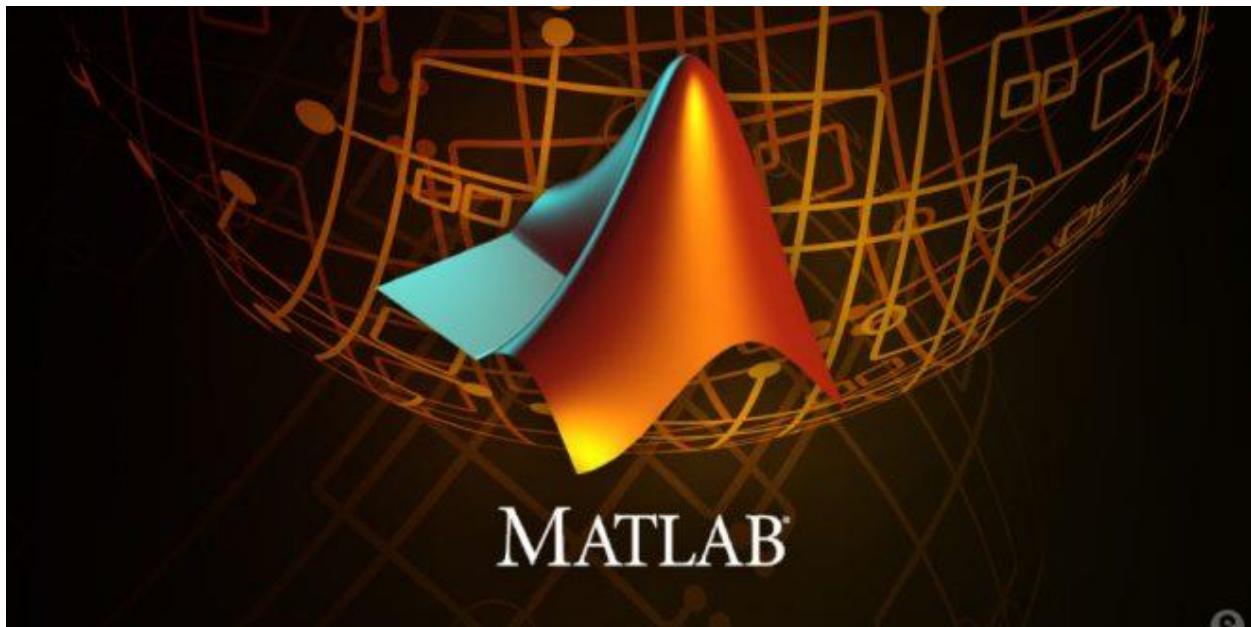




Course N°01

Introduction to the MATLAB environment



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The MATLAB environment

The MATLAB program displays a number of windows on startup:

- ✓ **Current folder** : indicates the current directory and existing files (see, Fig 1).
- ✓ **Command window** : we use it to formulate our expressions and interact with MATLAB, and it's the most widely used window (see, Fig 1).
- ✓ **Command history** : keeps track of all commands entered by the user (see, Fig 1).
- ✓ **Workspace** : indicates all existing variables with their types and values (see, Fig 1).

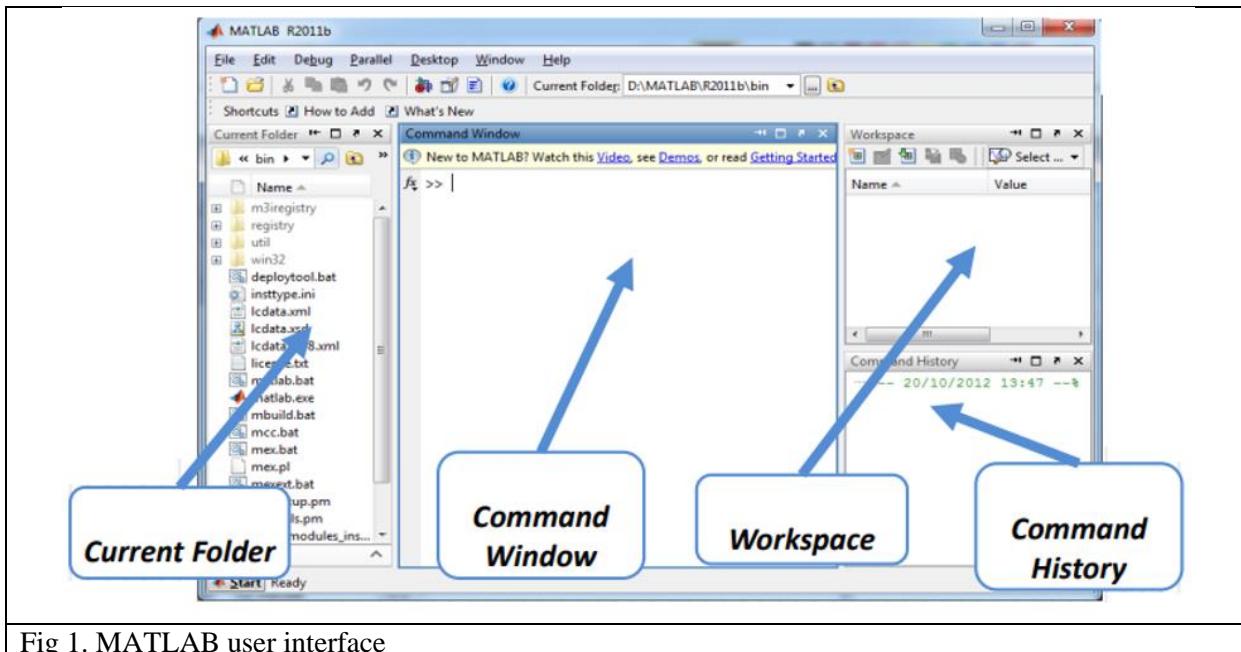


Fig 1. MATLAB user interface

Command window

date	is show day-month-year (see, Fig 2)
clock	is show year-month-day-hour-minute-second (see, Fig 2)

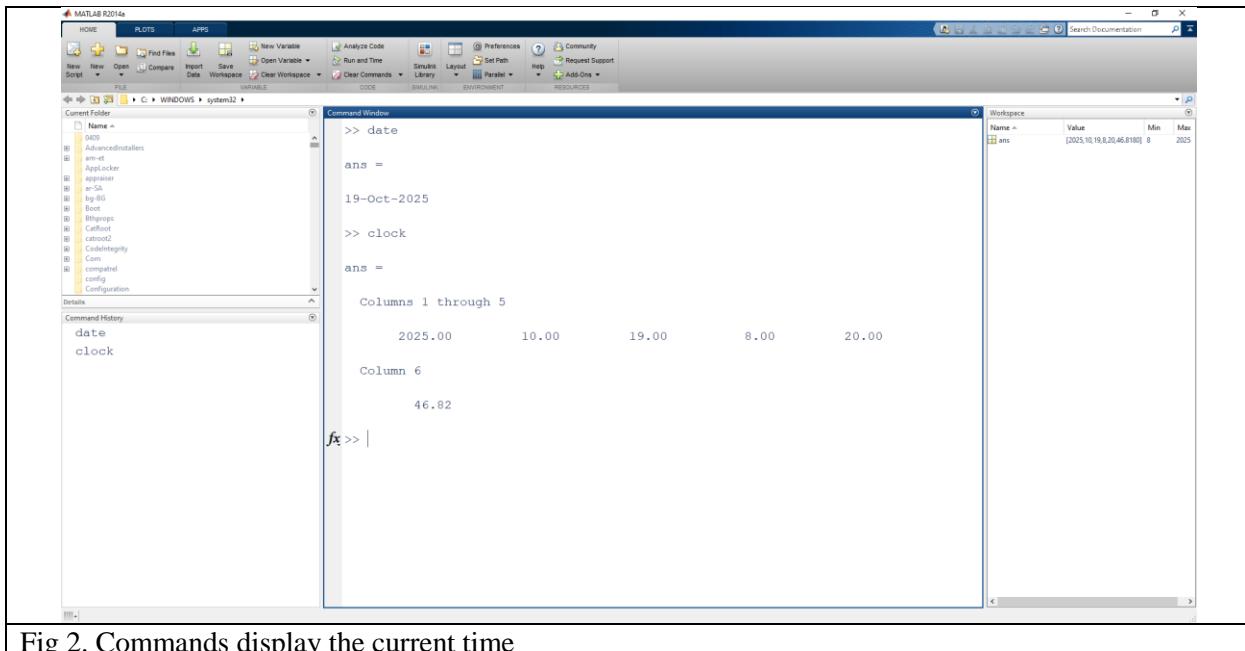


Fig 2. Commands display the current time

Arithmetic operator	
+	Addition (see, Fig 3)
-	Subtraction (see, Fig 3)
*	Multiplication (see, Fig 3)
/	Division left (see, Fig 3)
\	Division right (see, Fig 3) <i>Note. The boutons in keyboards ALT GR + 8</i>



The screenshot shows the MATLAB R2014a interface. The Command Window displays the following operations:

```

>> a = 5 + 4
a =
9.00

>> b = 5 - 4
b =
1.00

>> c = 5 * 4
c =
20.00

```

The Workspace browser on the right shows the variables a, b, and c with their respective values: a=9, b=1, and c=20.

Fig 3. The addition, subtraction and multiplication operations

The screenshot shows the MATLAB R2014a interface. The Command Window displays the following division operations:

```

>> d = 10 / 2
d =
5.00

>> e = 10 \ 2
e =
0.20

```

The Workspace browser on the right shows the variables d and e with their respective values: d=5 and e=0.2.

Fig 4. The division in left and right operations

Constants and special characters

pi	π (see, Fig 5)
inf	∞ infinite, is produced when dividing a non-zero number by zero (see, Fig 5)
NaN	No-Number (Not-a-Number) when there is no digit to display (inf/inf where 0/0) (see, Fig 5)



Fig 5. Test some MATLAB commands

Trigonometric functions in Rad

cos(x)	Cosinus (see, Fig 6) Note. The value of x in Rad
sin(x)	Sinus (see, Fig 6) Note. The value of x in Rad
tan(x)	Tangente (see, Fig 6) Note. The value of x in Rad
acos(x)	Arc cosinus
asin(x)	Arc sinus
atan(x)	Arc tangente

Fig 6. Test some trigonometric function commands in MATLAB

Trigonometric functions in Deg (°)	
<code>cosd(x)</code>	Cosinus (see, Fig 7) Note. The value of x in Deg
<code>sind(x)</code>	Sinus (see, Fig 7) Note. The value of x in Deg
<code>tand(x)</code>	Tangente (see, Fig 7) Note. The value of x in Deg

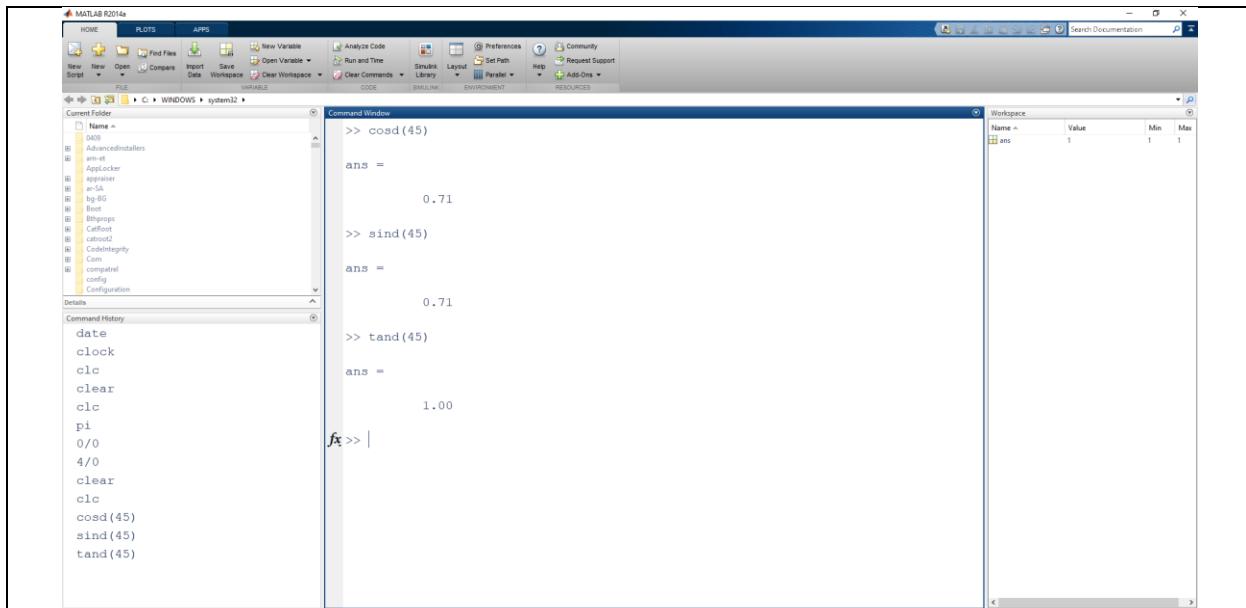


Fig 7. Test some trigonometric function commands in MATLAB

Mathematical functions	
<code>exp(y)</code>	Exponential e^y (see, Fig 8)
<code>log(y)</code>	Neperian logarithm $\ln(y)$ (see, Fig 8)
<code>log10(y)</code>	Decimal logarithm $\log_{10}(y)$ (see, Fig 8)
<code>sqrt(y)</code>	Square Root \sqrt{y} (see, Fig 9)
<code>x^y</code>	Power x^y (see, Fig 9)
<code>inv(y)</code>	Inverse $\frac{1}{y}$ (see, Fig 9)



```

>> exp(0)
ans =
1.00

>> log(1)
ans =
0

>> log10(10)
ans =
1.00

```

Fig 8. Test some mathematical function commands in MATLAB

```

>> sqrt(4)
ans =
2.00

>> 2^2
ans =
4.00

>> inv(2)
ans =
0.50

```

Fig 9. Test some mathematical function commands in MATLAB



Shortcut	
(The bouton 5
)	The bouton °
^	ALT GR + 9

Command window	
clear	Deletes all program variables (from memory)
clear x y	Deletes only variables x, y (from memory)
clc	Deletes the contents of the command window screen
quit, exit	Quitter MATLAB
ans	Most recent answer (MATLAB uses a default variable 'ans' to store the result)

Complex variables	
i ou j	Imaginaire pur ($i^2=j^2=-1$) (see, Fig 10)
real(z)	Partie réelle (see, Fig 11)
imag(z)	Partie imaginaire (see, Fig 11)
angle(z)	Argument θ (en radian) (see, Fig 12)
abs(z)	$ z $ (see, Fig 12)
conj(z)	Conjugué de z (\bar{z}) (see, Fig 12)

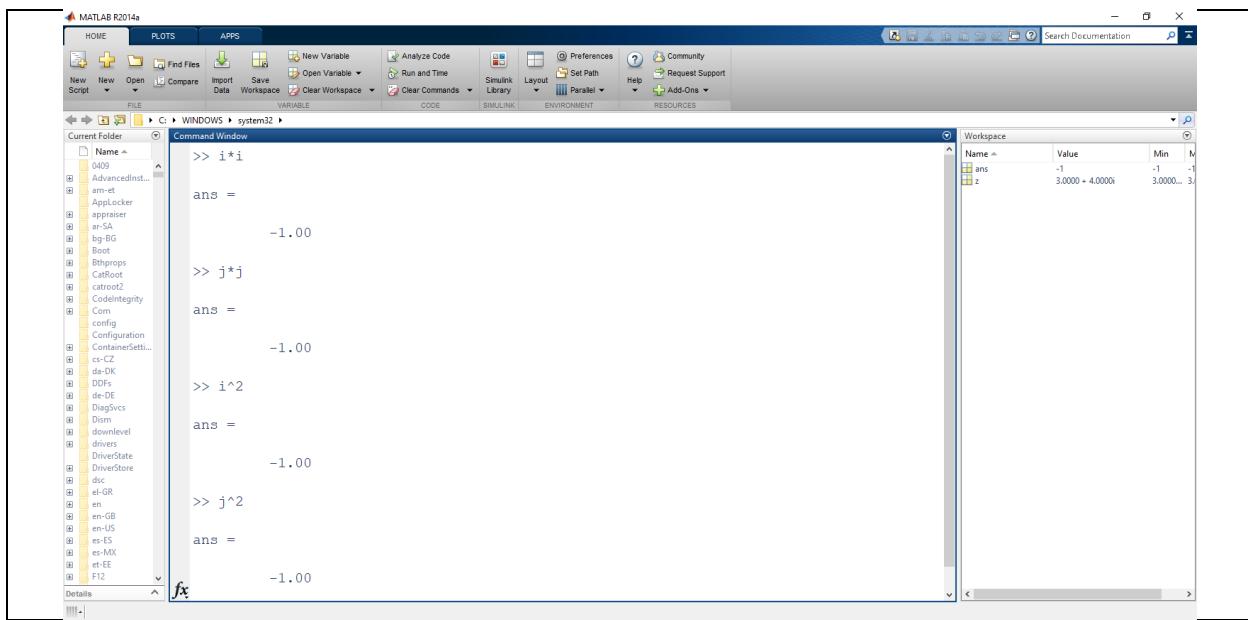


Fig 10. Test some complex variable commands in MATLAB



The screenshot shows the MATLAB R2014a interface. In the Command Window, the user has entered the following commands:

```

>> z = 3 + 4i
z =
3.00
4.00
>> real(z)
ans =
3.00
>> imag(z)
ans =
4.00

```

The Workspace browser on the right shows the variables `ans` and `z` defined.

Fig 11. Test some complex variable commands in MATLAB

The screenshot shows the MATLAB R2014a interface. In the Command Window, the user has entered the following commands:

```

>> z = 3 + 4i
z =
3.00
4.00
>> angle(z)
ans =
0.93
>> abs(z)
ans =
5.00
>> conj(z)
ans =
3.00

```

The Workspace browser on the right shows the variables `ans` and `z` defined.

Fig 12. Test some complex variable commands in MATLAB

Command window	
factorial(x)	x! to calculate the factorial of any number (see, Fig 13)
gamma(x+1)	x! to calculate the factorial of any (see, Fig 13)



```

MATLAB R2014a
HOME PLOTS APPS
New New Open Compare Import Data Workspace New Variable Open Variable Analyze Code Run and Time Preferences Community
New Script New Open Clear Commands Simulink Layout Set Path Help Request Support
FILE VARIABLE CODE SIMULINK ENVIRONMENT RESOURCES
Current Folder Command Window
>> factorial(4)
ans =
24.00
>> gamma(4+1)
ans =
24.00
fx >> |

```

Workspace			
Name	Value	Min	Max
ans	24	24	24

Fig 13. Test some commands in MATLAB

Command window	
gcd(x,y)	PGCD is the greatest common divisor of x and y (see, Fig 14)
lcm(x,y)	PPCM is the least common multiple of x and y (see, Fig 14)

```

MATLAB R2014a
HOME PLOTS APPS
New New Open Compare Import Data Workspace New Variable Open Variable Analyze Code Run and Time Preferences Community
New Script New Open Clear Commands Simulink Layout Set Path Help Request Support
FILE VARIABLE CODE SIMULINK ENVIRONMENT RESOURCES
Current Folder Command Window
>> gcd(20,8)
ans =
4.00
>> lcm(20,8)
ans =
40.00
fx >> |

```

Workspace			
Name	Value	Min	Max
ans	40	40	40

Fig 14. Test some commands in MATLAB



List of References

- [1] MATLAB A PRACTICAL INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING
- [2] MATLAB for Beginners
- [3] MATLAB A SELF-TEACHING GUIDE
- [4] Introduction à MATLAB et Simulink
- [5] Initiation à Matlab
- [6] A Matlab Exercise Book
- [7] MATLAB Essentials