

# Introduction to MATLAB

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## Introduction

- MATLAB stands for Matrix Laboratory.
- It's a proprietary (paid) programming platform specifically designed for engineers and scientists.
- It allows users to analyze data, create data visualizations, develop algorithms, and create models.

## Command Window

- In MATLAB, the Command Window is your interactive workspace. It's like a command center where you can directly interact with the software.
- The Command Window displays the command prompt `>>` and a cursor where commands are entered and are executed instantaneously on pressing the `Enter` key of the keyboard.

### What is the `ans` variable?

- Think of `ans` as a temporary "holding area" that MATLAB automatically creates under specific conditions.
- Whenever you execute a command or function without assigning the output to a named variable, the result gets stored in `ans`.

```
result = sin(pi/2); % `result` stores the output (1) explicitly
2 + 3 * 4;          % `ans` holds the implicit output (14)
```

In the second line, since we didn't assign the calculation (14) to a specific variable, it goes into the `ans` variable.

### Start with a clean slate:

```
clc
```

the `clc` command clears any previous commands or outputs from the window, giving you a fresh start.

**Example 1.1** from book [1].

**Example #1:** Find the value of  $z$  for the expression  $z = 2x + y$ , if  $x=5$  and  $y=7$ .

```
% Given values
x = 5;
y = 7;
```

```
% Expression for z
z = 2*x + y;
```

**Example #2:** Find the value of  $z$  for the expression  $z = (3x + 2y) / 4$ , if  $x=10$  and  $y=5$ .

```
% Given values
x = 10;
y = 5;

% Expression: z = (3x + 2y) / 4
z = (3*x + 2*y) / 4;
```

**Example #3:** Find the value of  $q$  for the expression  $q = x^2 + 2xy + y^2$ , if  $x=2$  and  $y=3$ .

```
% Given values
x = 2;
y = 3;

% Expression: q = x^2 + 2xy + y^2
q = x^2 + 2*x*y + y^2;
```

## Command History Window

- The Command History Window consists of a list of all the commands that are entered in the Command Window.

## Workspace

- A workspace is a collection of all the variables that have been generated so far in the current MATLAB session and shows their data type and size.
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**Check the current workspace:**

```
who
```

The `who` command shows you a list of all the currently defined variables and their values in the workspace.

## Some Useful MATLAB Commands

### General Commands

**date: ver:**

## Directory Commands

ls:

## Workspace Commands

who whos clear all clc clf

## Help commands

help helpwin help topic doc lookfor

## Key Terms

### True/False (Mark T for True and F for False)

- The clc command clears the command history. **True or False**
- The workspace stores all variables and their values during a session. **True or False**

### Multiple Choice (Select the best answer)

Which of the following statements is TRUE about MATLAB?

1. ☐ It's an open-source programming language.
2. ☐ It's specifically designed for engineers and scientists
3. ☐ It cannot be used for data visualization.

What does the ans variable represent in MATLAB?

1. ☐ A user-defined variable.
2. ☐ A temporary storage for implicit output.
3. ☐ A specific function for mathematical calculations.
4. ☐ A keyword for accessing the command history.

What does MATLAB stand for?

1. ☐ Mathematical Analysis Tool Box
2. ☐ Matrix Laboratory
3. ☐ Machine Learning Application Tool
4. ☐ Multi-function Analysis Language

What is the purpose of the clc command in MATLAB?

1. ☐ Clear the command history
2. ☐ Close the current figure window
3. ☐ Clear all variables in the workspace
4. ☐ Clear the screen and display a new prompt

What is the difference between the who and whos commands in MATLAB?

1. ☐ who displays all variables, while whos shows detailed information like size and class.
2. ☐ who shows only numeric variables, while whos displays all variable types.

3. ☐ who is used for clearing the workspace, and whos displays the command history.
4. ☐ There is no difference; both commands do the same thing.

What is the primary function of the help command in MATLAB?

1. ☐ To display the current working directory.
2. ☐ To provide information and documentation about MATLAB functions, commands, and syntax.
3. ☐ To save the current state of the workspace.
4. ☐ To clear the command window and history.

What does the "doc" command do in MATLAB?

1. ☐ Displays a list of available functions.
2. ☐ Opens the MATLAB documentation browser.
3. ☐ Prints the source code of a function.
4. ☐ Provides examples of MATLAB code.

How is the helpwin command different from the help command in MATLAB?

1. ☐ helpwin displays help text in a separate window, while help displays help text in the Command Window
2. ☐ helpwin is used for accessing documentation of built-in functions, while help is used for custom functions
3. ☐ There is no difference; both commands provide the same functionality
4. ☐ helpwin is used for accessing toolbox documentation, while help is used for accessing function documentation

What does the "ver" command in MATLAB do?

1. ☐ Verifies the syntax of a MATLAB script
2. ☐ Verifies the version of MATLAB currently installed
3. ☐ Verifies the integrity of MATLAB's installation files
4. ☐ Verifies the licensing information of MATLAB

Which command in MATLAB clears only the command window and doesn't affect the workspace?

1. ☐ clc
2. ☐ clear
3. ☐ close all
4. ☐ delete

What does the "clear all" command do in MATLAB?

1. ☐ Clears the command window
2. ☐ Removes all variables from the workspace
3. ☐ Deletes all files in the current directory
4. ☐ Exits MATLAB session

What does the "doc" command do in MATLAB?

1. ☐ Displays the content of a variable

2. ☐ Opens the MATLAB documentation browser with the specified topic
3. ☐ Clears the current command window
4. ☐ Executes a predefined MATLAB script

## Fill in the Blanks

- The keyword \_\_\_\_\_ displays all currently defined variables in the workspace. (who)

## Exercises

## Review Questions

- What is MATLAB and what is its primary area of application?
- List the major components of the MATLAB environment?
- What is the difference between who and whos commands?
- What is a script file?
- What is the workspace in MATLAB, and what is its purpose?
- What is the primary function of the command window in MATLAB?
- What is the purpose of the command history?

## References and Bibliography

[1] Raj Kumar Bansal, A. K. Goel, and Manoj Kumar Sharma, MATLAB and its applications in engineering : [based on MATLAB 7.5 (R2007b)]. Delhi: Pearson, 2012.