

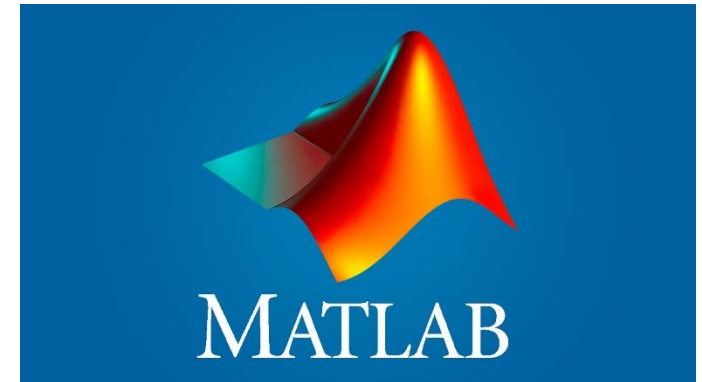
MAT 1206 – Introduction to MATLAB

CHAPTER 01: Introduction

Lesson 1

Content

- What is MATLAB
- MATLAB 's Power of Computational Mathematics
- Uses of MATLAB
- MATLAB Environment Setup
- Understanding the MATLAB Environment
- MATLAB Help



What is MATLAB

- MATLAB (**matrix laboratory**) is a high-level programming language and interactive environment for numerical computation, visualization and programming.

- MATLAB is developed by MathWorks.

MathWorks is an American privately held corporation that specializes in mathematical computing software.



Cont.

- MATLAB allows:
 - matrix manipulations
 - plotting of functions and data
 - interfacing with programs written in other languages including C, C++, and Java
 - creation of user interfaces
 - analyze data
 - implementation of algorithms
 - create models and applications
- It has numerous built-in commands and math functions that help you in mathematical calculations, generating plots, and performing numerical methods.

MATLAB 's Power of Computational Mathematics

- MATLAB is used in every aspect of computational mathematics. Following are some commonly used mathematical calculations:
 - Dealing with Matrices and Arrays
 - 2-D and 3-D Plotting and graphics
 - Linear Algebra
 - Algebraic Equations
 - Non-linear Functions
 - Statistics
 - Data Analysis
 - Calculus and Differential Equations
 - Numerical Calculations
 - Integration
 - Transforms
 - Curve Fitting

Uses of MATLAB

- MATLAB is widely used as a computational tool in science and engineering encompassing the fields of physics, chemistry, mathematics and all engineering streams.
- It is used in a range of applications including:
 - signal processing and Communications
 - image and video Processing
 - control systems
 - test and measurement
 - computational finance
 - computational biology

MATLAB Environment Setup

- Setting up MATLAB environment is a matter of few clicks.
- MathWorks provides the licensed product, a trial version and a student version as well.

Understanding the MATLAB Environment

- MATLAB development (Integrated Development Environment) IDE can be launched from the icon created on the desktop.

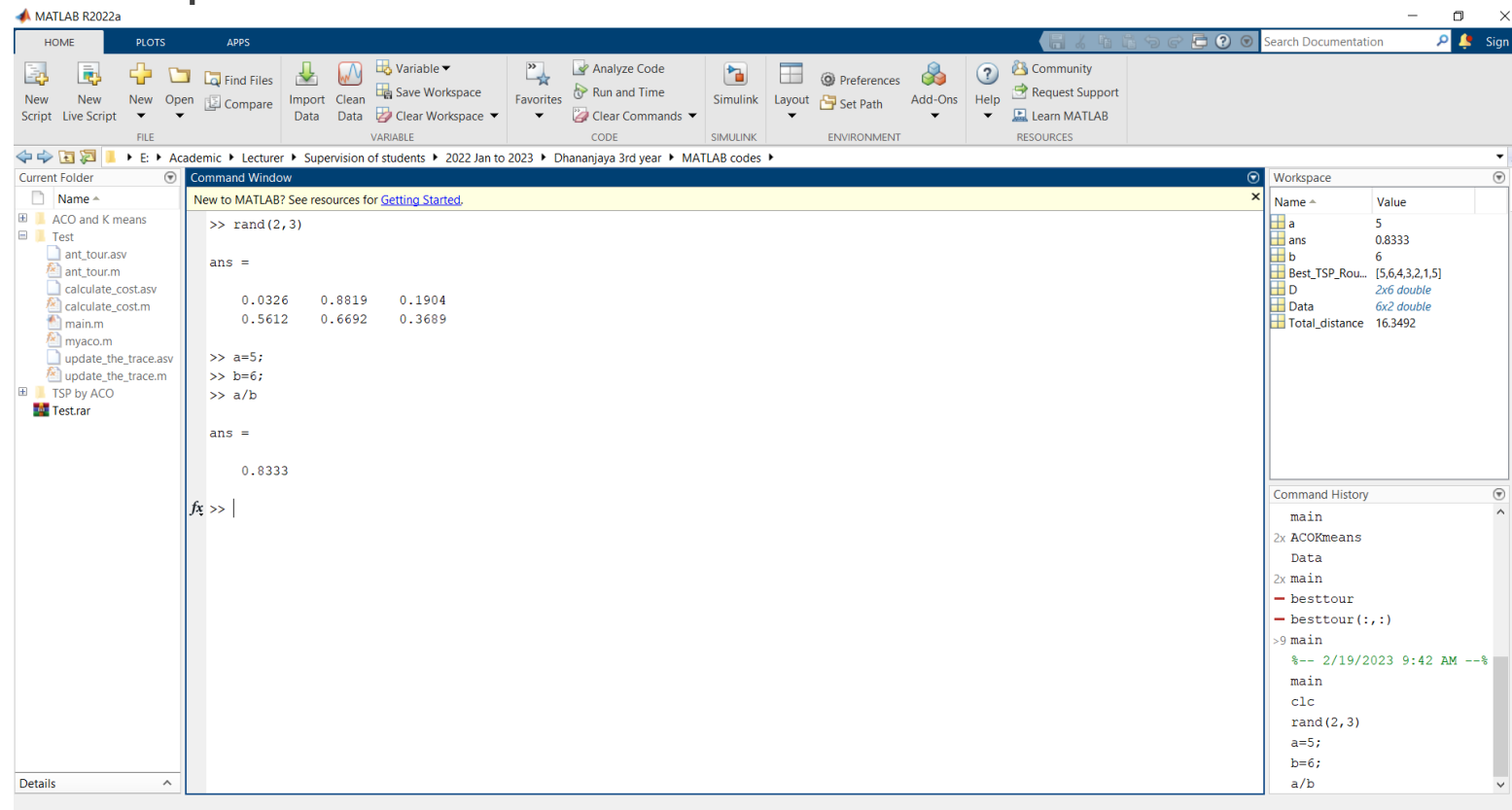
An IDE is a software application that provides comprehensive facilities to computer programmers for software development.



- The main working window in MATLAB is called the desktop. When MATLAB is started, the desktop appears in its default layout.

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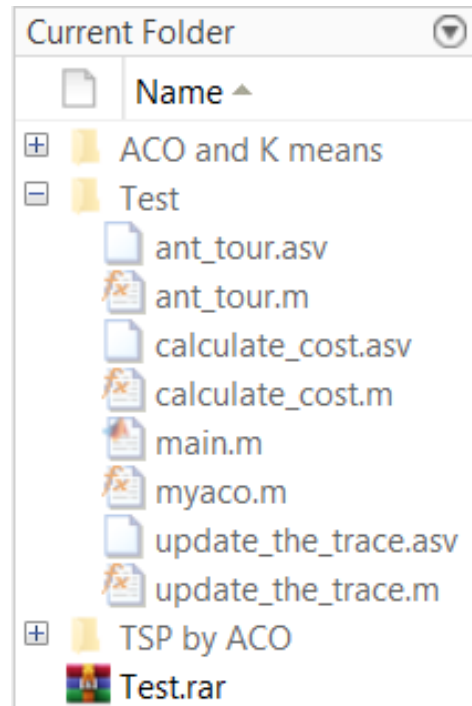
- MATLAB desktop window:



Cont.

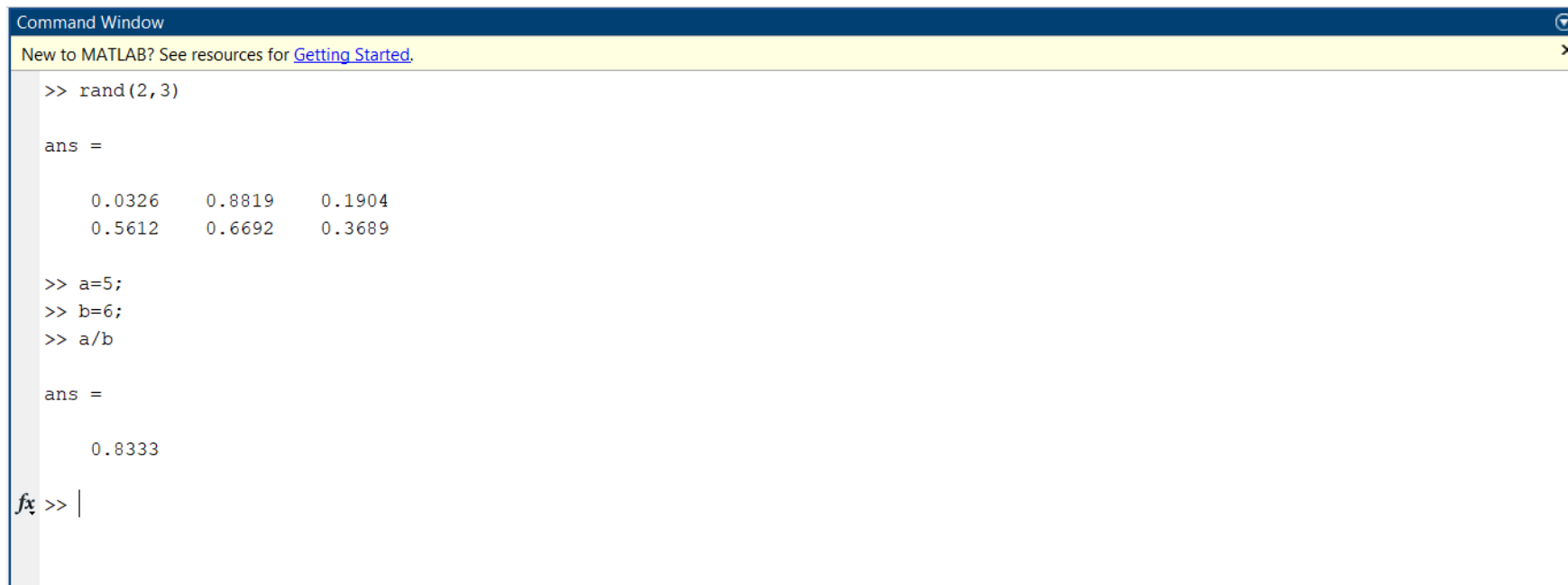
- The desktop has the following panels:

Current Folder - This panel allows you to access the project folders and files.



Cont.

Command Window - This is the main area where commands can be entered at the command line. It is indicated by the command prompt (>>).



```
Command Window
New to MATLAB? See resources for Getting Started.
>> rand(2,3)

ans =

    0.0326    0.8819    0.1904
    0.5612    0.6692    0.3689

>> a=5;
>> b=6;
>> a/b

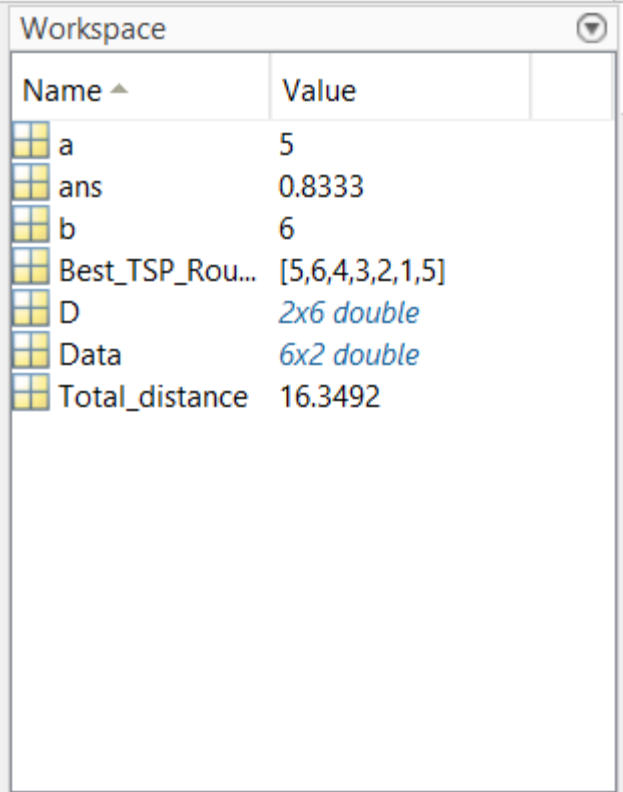
ans =

    0.8333

fx >> |
```

Cont.

Workspace - The workspace shows all the variables created and/or imported from files.

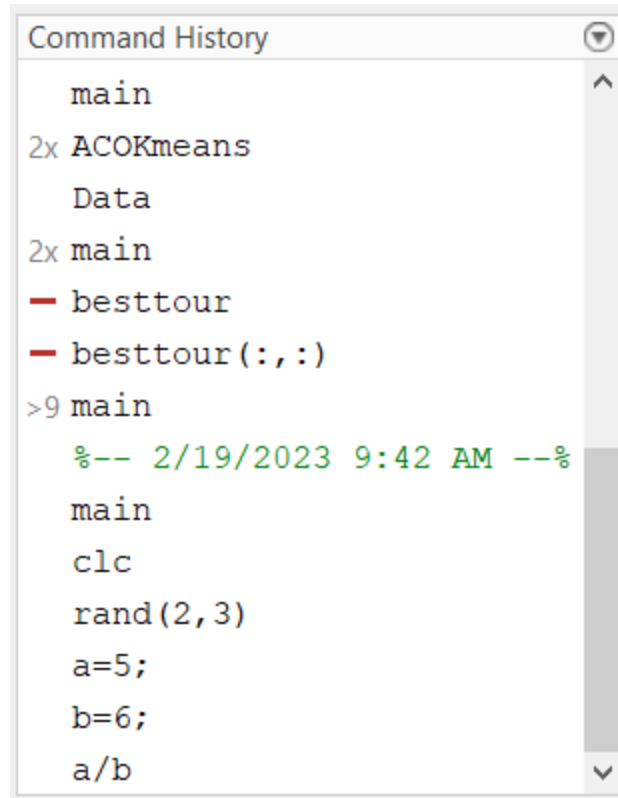


The image shows a screenshot of the MATLAB Workspace window. It contains a table with two columns: 'Name' and 'Value'. The variables listed are 'a' (value 5), 'ans' (value 0.8333), 'b' (value 6), 'Best_TSP_Rou...' (value [5,6,4,3,2,1,5]), 'D' (value 2x6 double), 'Data' (value 6x2 double), and 'Total_distance' (value 16.3492). Each variable name has a small icon to its left.

Name ▲	Value
a	5
ans	0.8333
b	6
Best_TSP_Rou...	[5,6,4,3,2,1,5]
D	2x6 double
Data	6x2 double
Total_distance	16.3492

Cont.

Command History - This panel shows or rerun commands that are entered at the command line.

A screenshot of the MATLAB Command History window. The window has a title bar that says "Command History" and a close button. The list of commands includes "main", "2x ACOKmeans", "Data", "2x main", "besttour" (with a red minus icon), "besttour(:, :)" (with a red minus icon), ">9 main", a separator line "%-- 2/19/2023 9:42 AM --%", and a series of commands: "main", "clc", "rand(2,3)", "a=5;", "b=6;", and "a/b". A vertical scrollbar is on the right side of the list.

```
Command History
main
2x ACOKmeans
Data
2x main
- besttour
- besttour(:, :)
>9 main
%-- 2/19/2023 9:42 AM --%
main
clc
rand(2,3)
a=5;
b=6;
a/b
```

Cont.

The image displays the MATLAB R2022a software interface. The top menu bar includes options like HOME, PLOTS, and APPS. Below the menu is a toolbar with various icons for file operations, variable management, and code execution. The main workspace is divided into three panels:

- Current Folder:** Located on the left, it shows a file explorer view of the current directory. It contains a folder named 'Test' with several files including 'ant_tour.asv', 'ant_tour.m', 'calculate_cost.asv', 'calculate_cost.m', 'main.m', 'myaco.m', 'update_the_trace.asv', 'update_the_trace.m', 'TSP by ACO', and 'Test.rar'. An orange label 'Current Folder' is placed over this panel.
- Command Window:** The central panel where MATLAB commands are entered and executed. It shows the following commands and their outputs:

```
>> rand(2,3)

ans =

    0.0326    0.8819    0.1904
    0.5612    0.6692    0.3689

>> a=5;
>> b=6;
>> a/b

ans =

    0.8333
```

An orange label 'Command Window' is placed over this panel.
- Workspace:** Located on the right, it displays a table of variables currently in the workspace. An orange label 'Workspace' is placed over this panel.

The Workspace panel shows the following variables:

Name	Value
a	5
ans	0.8333
b	6
Best_TSP_Rou...	[5,6,4,3,2,1,5]
D	2x6 double
Data	6x2 double
Total_distance	16.3492

Below the Workspace panel is the **Command History** panel, which shows a list of previously executed commands. An orange label 'Command History' is placed over this panel.

MATLAB Help

- MATLAB offers several options for getting help on MathWorks products.
- Access abbreviated function *help* text in the Command Window:

```
Command Window
New to MATLAB? See resources for Getting Started.

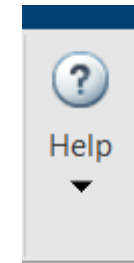
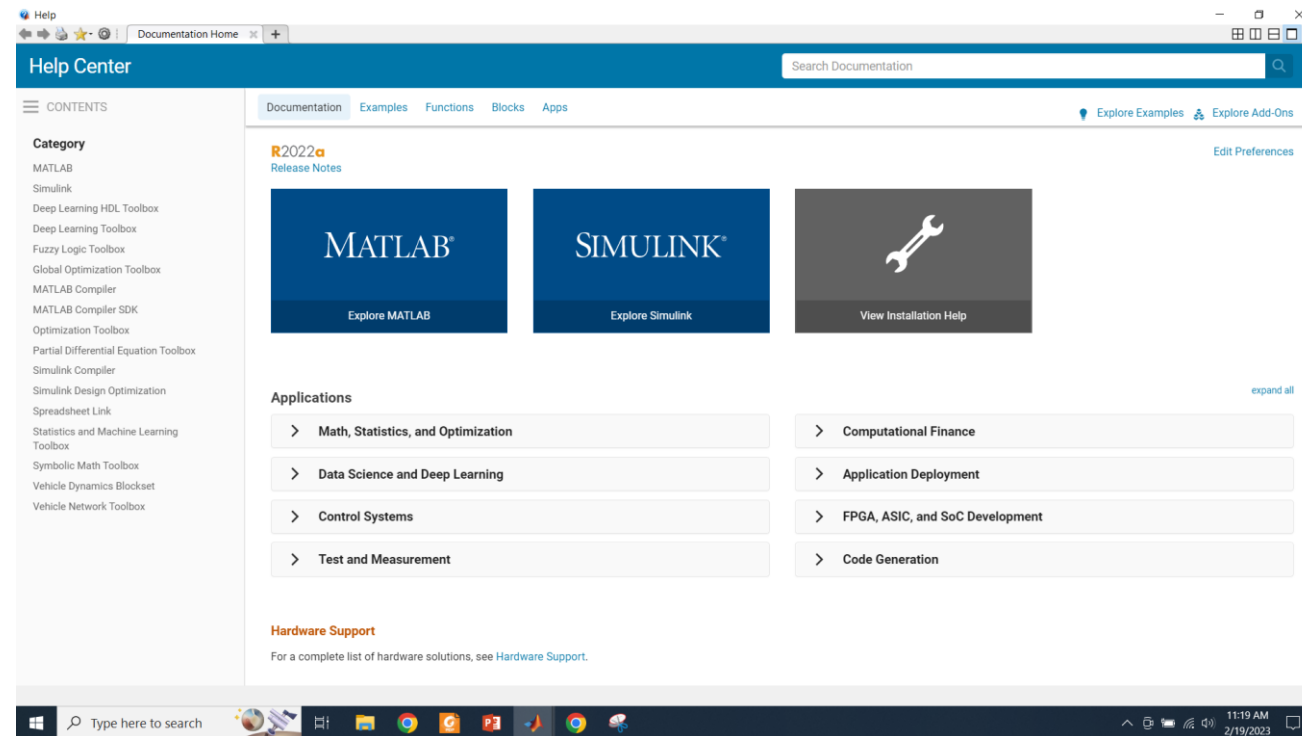
>> help rand
rand Uniformly distributed pseudorandom numbers.
  R = rand(N) returns an N-by-N matrix containing pseudorandom values drawn
  from the standard uniform distribution on the open interval(0,1).  rand(M,N)
  or rand([M,N]) returns an M-by-N matrix.  rand(M,N,P,...) or
  rand([M,N,P,...]) returns an M-by-N-by-P-by-... array.  rand returns a
  scalar.  rand(SIZE(A)) returns an array the same size as A.

Note: The size inputs M, N, P, ... should be nonnegative integers.
Negative integers are treated as 0.

R = rand(..., CLASSNAME) returns an array of uniform values of the
specified class. CLASSNAME can be 'double' or 'single'.
```

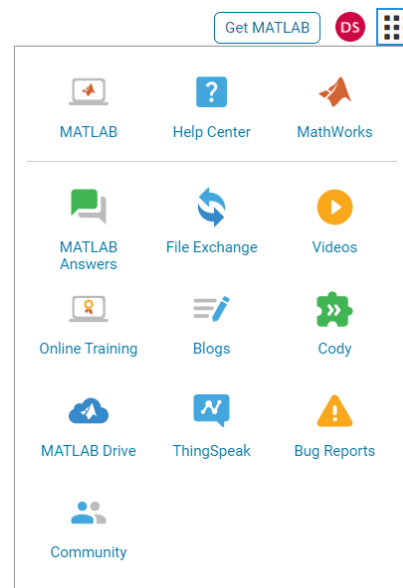
Cont.

- Search the documentation (Help Center) for in-depth, comprehensive help topics and examples.



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- MathWorks Account: Learn how MATLAB Answers™, File Exchange, Cody™, and Blogs help MATLAB Central™ community members find answers to their technical questions, get code, practice their programming skills, and stay up to date on ways engineers and scientists around the world use MATLAB® to do their work.



Create MathWorks Account

1. Go to the MathWorks Account Creation page:
<https://www.mathworks.com/mwaccount/register>
2. Provide the required information
3. Click 'Create'
4. Click link in email from MathWorks to verify your email address
5. Provide the required information to finish creating your profile, and accept Online Services Agreement
6. Click 'Create'

Questions/queries?

