Subject: Introduction to Computing
Topic: Matlab @ Introduction
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What is MATLAB??

- It is a software package/ language developed to ease the complicated numerical computation
- The Matlab language was created by Prof. Cleve B. Moler, Professor of Computer Science (a specialist in numerical analysis) at the University of New Mexico.
- It has since spawned several commercial and open-source derivatives of the original matlab language.
- Today, the premier commercial version is MATLAB (R) by The Mathworks, Inc., and the best free, open-source version appears to be Octave.
- https://in.mathworks.com/

What is MATLAB??

- MATLAB stands for MAT + LAB

  MAT = MATRIX

  LAB = LABORATORY

  Matlab stands for matrix laboratory
- All the calculations done in MATALB is in form of matrices.
- It creates ease in calculations of Matrix operation in comparison of others existing software and programming languages

Features of MATLAB

- **Inbuilt functions**
  - inv, eig, roots, quad, triplequad, besselj, fzero
- **User defined function**
  - You can define your own program similar to inbuilt function
- **Ease in computation work**
  - Linear algebra
  - Solving differential equations
  - Data analysis
  - Interpolation and curve fitting

Features of MATLAB

- **Toolbox**
  - Simulink
  - Image processing
  - Neural Networks
  - Bioinformatics
- **Possibility of external interfacing** with other programming languages (C, C++ and Fortran etc)

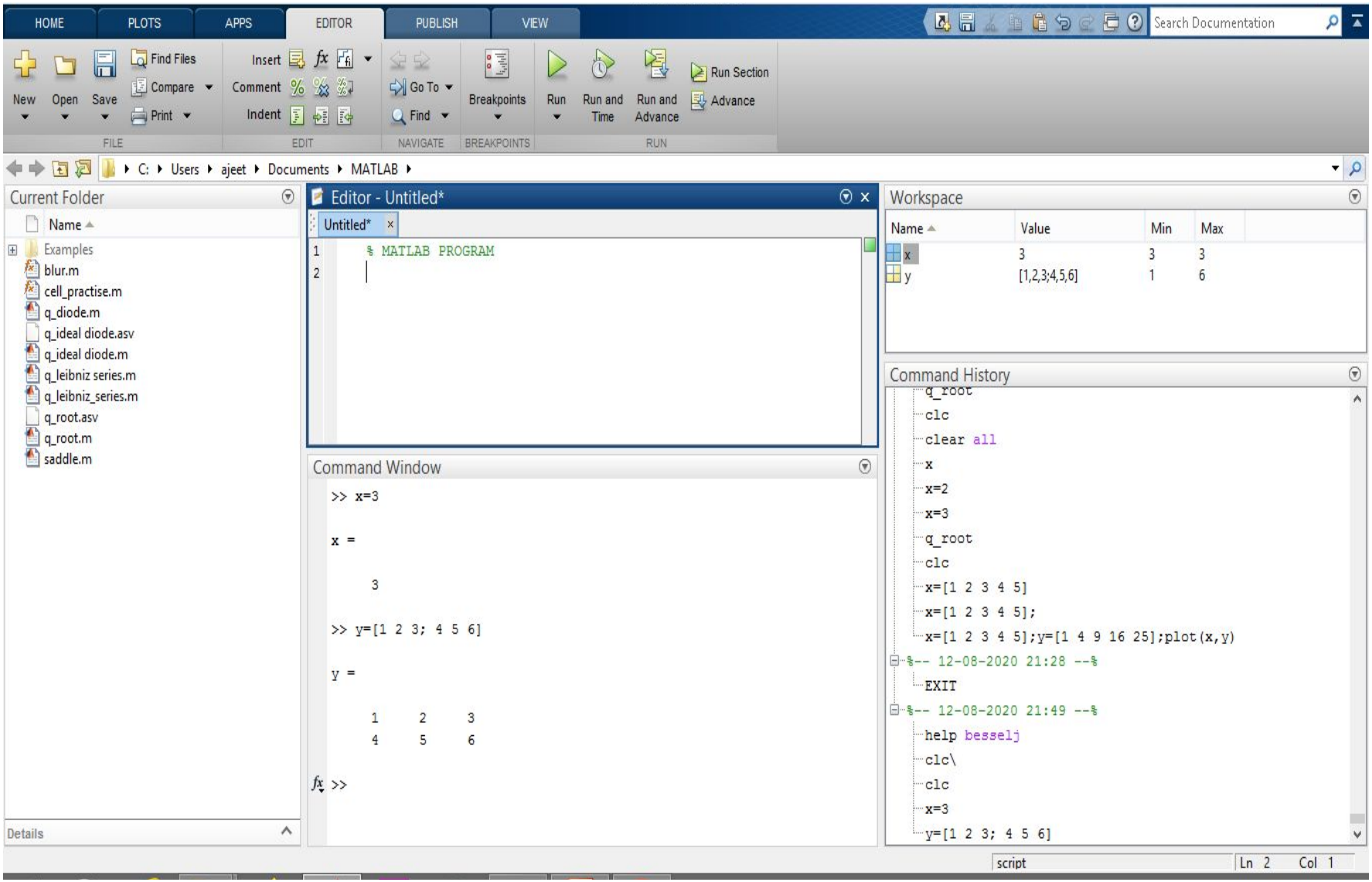
- **Efficient Graphical Unser Interface (GUI)**
  - Create ease in analysing the results

Features of MATLAB

- **Data Handling**
  - Data handling is much easier in MALTAB
  - Matrix Operation and Array Operation both can be handled with ease just by using different operators.
  - No need to define type of variable (REAL, INTEGER OR COMPLEX)
  - No need to define dimension of array
  - No need to define single precession or double precession for calculation

- **Limitation**
  - Symbolic calculation: It also support symbolic calculation but with certain limitation.
  - Mathematica Software is Software used for strong and efficient symbolic calculation

MATLAB LAYOUT



Default Layout of MATLAB

- Address bar
- Current folder
  - Show all folders and files
- Command Window
  - Starts with " >>"" , all commands execute here !!
- Command History
  - Show all previous commands with date
- Workspace
  - Display all of the variable
- Layout can be changes as per user's choice using "Layout" option

File Type

- There are mainly three types of file in MATLAB
  - M-files
  - MAT-files
  - MEX-files

File Type

- **M-files**
  - M-files are standard ASCII text files.
  - File name of M-files are with extension (.m).
  - Any program written in a MATLAB editor is saved as M-files.
  - These files are further classified as
    - Script file
    - Function file

File Type

- **Script file**
  - It is a file written in matlab editor to solve the given problem and saved with extension .m
    - » File can be executed by two ways
      - Typing file name in command window (Be careful about folder location)
      - Using the icon RUN () provided in MATLAB

File Type

- **Function file**
  - It is a file written in matlab editor using special syntax
  - Function file can be used called in other script/function file
  - Saved with extension .m
  - Function file can be executed by writing file name and required input parameters
  - Details of function file will be discussed in coming session

File Type

- **MAT-files**
  - MAT-file is binary file used to save the data.
  - Thus it is recognized as Data File
  - MAT-file can be read by MATLAB environment
  - Save with extension ".mat"
  - MAT-files are double-precision MATLAB format files.
  - They can be created on one machine and later read by MATLAB on another machine with a different floating-point format, retaining as much accuracy and range as the different formats allow.
  - They can also be manipulated by other programs external to MATLAB.
  - Working of MAT-files will be discussed in coming lectures

File Type

- **MEX-files**
  - A **MEX file** is a function, created in **MATLAB**, that calls a C/C++ program or a Fortran subroutine. A **MEX** function behaves just like a **MATLAB** script or function.
  - Students are advised to read about this as per their own interest.

OUTPUT DISPLAY

- format
  - format long: Display 15 places after decimal
  - format short: Display 4 places after decimal
  - format long e: Display 15 places after decimal followed by exponential
  - format short e: Display 4 places after decimal followed by exponential
  - format long g: Total 15 digits
  - format short g: Total 5 digits