Introduction to MATLAB

Part 1: Familiarize the user interface

- Explain the user interface: Workspace, Editor, Command window
- Some important functions: Run, breakpoints, pause
- How to open a new script, save the script and execute the script.
- How to clear the workspace and command window
- How to comment and save the workspace

Part 2: Types of variables

For each variable-type the following components can be explained.

- Defining the variable (how to define specific type of variable, long, character)
- Assigning the values to variable
- Show the workspace of the variable (how the values are stored)
- Get (referring) the value of the variable (indexing)
- Size() and length() functions can be shown

Types of variables

- Scalar variable
- Array (1D, 2D)
- Forming a matrix of $n * m$ using 2D array

Part 3: Basic arithmetic operations on variables

- Addition/subtraction/multiplication/division of scalar variable
- Addition/subtraction of matrices
- Operations on single element of the array
- Operations on single row of the array/matrix
- Operations on single column of the array/matrix
- Matrix multiplication and division using inv() function

Part 4: Loops

- Why loops?
- Logical expression (< , <= , > , >= , ==)
- Usage of For and While loops

Part 5: Functions

- Why Functions?
- How to define the Fucntion (format)
- Using the Function in the main code

Part 6: Visualization and post processing

Explain following commands with basic features:

plot(x,y) contour(x,y,z) semilogx(x,y) semilogy(x,y)

Practice problems

Summation of numbers (basic, Loops)

Declare the set of numbers:

Numbers from 1 to N (a = [1 2 3 4 … N])

Or

User defined array (a = [1 3 8 6 10 5 …])

Or

Integers between 1 and 2^x (x is the input)

Use For and While loop to compute the sum of all the number

Find the largest number in the set (intermediate, Loops)

Declare the set of numbers from the user (a = [1 3 8 6 10 5 …]).

Use For and While loop to compare two numbers consecutively and find the largest number in the set.

Construct the common array S3 (intermediate, Loops)

Declare two arrays S1 and S2 containing the numbers. Construct S3, a new array, such that it contains both S1 and S2 and is as short as possible (no repetition of the numbers and use nested loops).

Example:

S1 = [1 2 3 4 5], S2 = [5 10 1 20 16 37]

S3 = [1 2 3 4 5 10 20 16 37]

Use For and While loop to compare the arrays S1 and S2 and create the S3 by knowing the repeated elements.

Find the factors (basic, Functions)

For the given set of numbers, find all the factors of each number and tabulate.

Step 1. Declare the number set from the user defined input (a = [1 3 8 6 10 5 …])

Step 2. Write a Function to find all the factors of a given number

Step 3. Use this function to get the factors for all the numbers in the set using a loop

Step 4. Tabulate the data and print it