Thapar Institute of Engineering and Technology, Patiala
School of Mathematics
Optimization Techniques: Lab - 1(Basics of MATLAB)

1. Know User Interface of MATLAB. Command Window, Workspace, Editor, Current folder-accessing old (.m) file, path to save script file, etc.

2. Fundamental Expressions. Basic Mathematical Expression, operations and Special Variables. For example: Addition, multiplication, log, exp, sin, ceil, floor, pi, inf, NaN, end, intmax, $*, /, power, .*$ etc.

3. Explore Array. Vector, Array, Row-Column, Input-matrix of order $(m, n), ones(m, n), zeros(m, n), eye(n), rand(m, n)$, hilb, size(c), increment etc. Writing array with step size, Operations on Matrix-array multiplication(*), and (.*), inverse of multiplication, etc.

4. Plotting vectors plot(x,y), Plot Options - Color of plot, Marker, Line Style; Annotating Plot: for example: plot (x,y,'-') , xlabel('year'), etc, grid on, grid off, hold on, etc.

4. Accessing Data in vectors/arrays Accessing number of elements in array, length, size, changing values in array, updating array, locating position of elements in array, and its corresponding values for example: $[xmin, xindex]$

5. Loop, Do-while, while etc.

Practice Problems

Problem 1. Input an array containing natural numbers with use of increment.

Problem 2. Consider a matrix $\begin{pmatrix} 4 & 1 & 3 \\ 2 & 6 & 7 \\ 3 & 1 & 8 \end{pmatrix}$. Find location of least element in matrix and update this with a value 10.

Problem 3. Consider a matrix $\begin{pmatrix} 4 & 1 & 3 \\ 2 & 6 & 7 \\ 3 & 1 & 8 \end{pmatrix}$. Sort the elements in matrix and update each row/column in ascending order.

Problem 4. Find all points that lie on line $2x + 4y = 12$, when $x \in [0, 12]$. Plot line.

Problem 5. Find intersection point of the two given lines: $2x + 4y = 12$ and $3x + 2y = 12$