Indian Institute of Space Science and Technology – Thiruvananthapuram

Assignment-II

1. Plot (x,y) on the basis of the following information:
   - $x = [0, 0.53, 1.05, 1.58, 2.11, 2.63, 3.16, 3.68, 4.21, 4.74, 5.26, 5.79, 6.32, 6.84]$
   - $y = [0, 0.51, 0.87, 1., 0.86, 0.49, -0.02, -0.51, -0.88, -1., -0.85, -0.47, 0.04, 0.53]$
   - Label X and Y axis
   - Give a title for the figure

2. (a) Create a matrix A using the following information First row:(6,4,2), second row: (-5,-3,-3), third row: (2,2,3).
   (b) Create b vector where $b = (1, 1.0, 2)^T$.
   (c) Find eigenvalues and corresponding eigenvectors of A.
   (d) Find norm of b.

3. a=$(1, -3, 5, 6)^T$, $b = (7, 4, -9, 0)^T$
   (a) Using a suitable data structure store a and b.
   (b) Find the inner product of a and b.

4. Plot Histogram using the following information:
   - population age = [22,55,62,45,21,22,34,42,42,4,2,102,95,85,55,110,120, 70,65,55,111,115,80,75,65,54,44,43,42,48] bins = [0,10,20,30,40,50,60,70,80,90,100]
   - x-label: age groups, y-label: Number of people, Title: Histogram

5. (a) Generate 1000 random numbers from [0,1) and store the first 500 in vector x and remaining in vector y.
   (b) Find $z = x * (x + y)$. Plot scatter plot for representing z. Set axis labels and figure title.

6. x=[1,-2,4], y=[-3,2,4]. Plot the hyperplane $z = 2x + 3y + 6$. Set label and title.

7. Plot a figure using the following information.(Figures should have axis labels and title)

   (a) $f : [-3, 3] \to \mathbb{R}$ where $f(x) = cosx + \frac{1}{1 + exp - (2x)}$.

   (b) $f : [-16, 10] \to \mathbb{R}$ where $f(x) = \frac{2 + 2x}{5sinx - 6}$. Draw the tangent line to f at x=-6.

   (c) $f : [0, 2] \times [0, 1] \to \mathbb{R}$ where $f(x) = \|x\|^2$.

8. Data: Adult data set [Download the data from UCI machine learning repository].

   (a) Write the syntax to read the data.

   (b) Print the distinct elements of first attribute.

   (c) Print the names of the attribute.

   (d) Print the first 5 rows of the data.