

## Lab Worksheet (Week-5)

### Plotting and Visualization

1. Plot a function  $x^5 + 4x^3 + 3x^2 + x + 1$ , together with its first, second, third, and fourth derivatives. Give the title *Plotting of 5-degree polynomial and its derivatives*, with the following properties:
  - (i) Use the 100 points over a range  $-5$  to  $2$ .
  - (ii) Use different colors for each function.
  - (iii) Label the axes and use a legend in the lower right corner.
  - (iv) Use different line styles.
2. Write a Python program to draw a scatter plot for comparing Mathematics and Science subject marks. Use marks of 10 students.  
Sample data:  
Test Data:  
math marks = [88, 92, 80, 89, 100, 80, 60, 100, 80, 34]  
science marks = [35, 79, 79, 48, 100, 88, 32, 45, 20, 30]  
marks range = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]
3. Write a Python program to draw a graph of  $e^{-x^2} \cos(40x)$  bounded by  $-e^{-x^2}$  and  $e^{-x^2}$ . Use 1000 points over a range  $-2$  to  $2$  and the same color for both the bounds. Save it by the name *Graph*.
4. Write a Python program to plot the vectors  $[1, 1, 1]$ ,  $[2, -1, 5]$ , and  $[4, 1, -2]$  in  $3D$ .