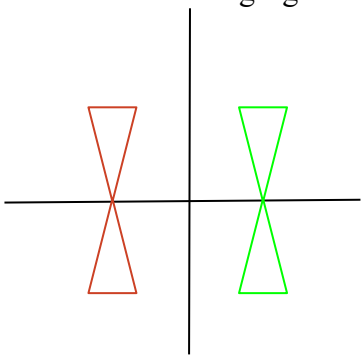
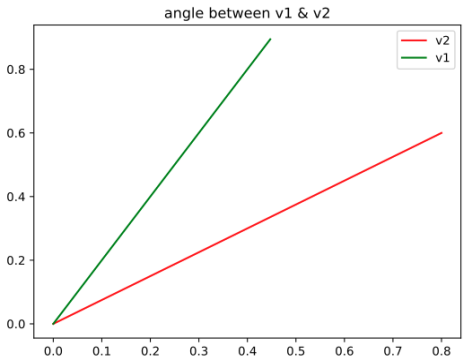
Assignment-9 Advanced Uses of "numpy" & "matplotlib"
Subject: Computer Science Workshop - 1 (CSE 2141)
Session: Sep 2025 to Jan 2026
Branch: Computer Science and Engineering (CSE)
Section: All
Course Outcome: CO5, CO6
Program Outcomes: PO1, PO2, PO3, and PO5
Learning Levels: Remembering (L1), Understanding (L2), Application (L3), Analysis (L4)

Q no.	Questions	Learning Levels
Q1.	Create a NumPy array of 10 equally spaced values between 0 and π. Perform the following operations on the array: 1. Compute sine values 2. Compute cosine values 3. Compute square root of each element 4. Display all results with proper formatting	L1, L2
Q2.	Write a Python program to: 1. Create an array of angles in degrees: [0, 30, 45, 60, 90] 2. Convert the angles into radians using NumPy 3. Compute sin, cos, and tan values of the angles 4. Display the results in tabular format	L1, L2
Q3.	Create a NumPy array containing values [1, 2, 4, 8, 16]. Using NumPy functions: 1. Find the natural logarithm 2. Find the base-10 logarithm 3. Find the base-2 logarithm 4. Find the exponential of each element	L1, L2
Q4.	Write a Python program to: 1. Generate 50 equally spaced values between 0 and 2π using NumPy 2. Compute the sine, cosine, and tangent of each value 3. Plot the sine, cosine, and tangent curve using Matplotlib	L2, L3
Q5.	Write a Python program to: 1. Generate **100 equally spaced values** between **−20 and 25** using np.linspace(). 2. Compute and plot **two polynomial functions** on the **same graph**: o $y1=x^3-15x^2+25$ o $y2=2x^2-10x+5$	L2, L3

	3. Use **different colors or line styles** to clearly distinguish the two curves. 4. Add a suitable **title**, **X-axis label**, and **Y-axis label**. 5. Display a **legend** identifying both polynomial curves. 6. Show the graph using Matplotlib.	
Q6.	**Visualize the sine and cosine functions using NumPy and Matplotlib.** Generate the x values from **0 to 2π** with an **interval of 0.1**, and compute the corresponding **sine and cosine values**. Plot both curves on the **same graph**, where the **sine function** is displayed in **blue with a solid line**, and the **cosine function** is displayed in **red with a dashed line**. Label the **x-axis** as *"X values (radians)"* and the **y-axis** as *"Function values"*. Add the title *"Sine and Cosine Functions"* and include a **legend** to clearly distinguish between the two curves.	L3, L4
Q7.	Draw the following figure using matplotlib. 	L2, L3
Q8.	Plot two normalized vectors from the origin using Matplotlib. Represent vector v1 in green color and vector v2 in red color. Ensure that both vectors originate from the origin, and include a legend to identify them clearly. 	L3, L4
	-END-	