**TASK SHEET**

1. Write a function that calculates the Euclidean distance between two points represented as NumPy arrays in n-dimensional space.
2. Implement a program that performs element-wise multiplication of two NumPy arrays without using the numpy.multiply function.
3. Create a function that takes a 2D NumPy array as input and returns the indices of the maximum value in each row.
4. Write a program that reads an image file using NumPy and converts it to grayscale.
5. Develop a function that takes a NumPy array as input and returns the indices of the top k largest values.
6. Implement a program that calculates the determinant of a square matrix using NumPy.
7. Create a function that takes a NumPy array as input and returns the indices of the non-zero elements.
8. Write a program that performs matrix multiplication of two randomly generated NumPy arrays.
9. Develop a function that takes a NumPy array as input and returns the indices of the local maxima (values greater than both of their neighbors).
10. Implement a program that calculates the moving average of a NumPy array with a specified window size.

Question 11: Polynomial Fitting

Generate noisy data points using a mathematical function, and then fit a polynomial of a specified degree to the data using NumPy's polyfit function.

Question 12: Image Manipulation

Read an image using NumPy, convert it to grayscale, and apply a custom convolution kernel for edge detection.

Question 13: Broadcasting and Reduction

Normalize each row of a 2D array such that the sum of each row becomes 1.

Question 14: Random Walk Simulation

Simulate a 1D random walk by generating an array of random steps and then calculating the cumulative sum.

Question 15: FFT and Signal Processing

Generate a synthetic signal with multiple sinusoidal components, then use the Fast Fourier Transform (FFT) to analyze its frequency content.