Ex.No-1 NUMPY

AIM:

To calculate the values for the mathematical formulas using NumPy library

# INTEGRATED DEVELOPMENT ENVIRONMENT (IDE) REQUIRED:

JUPYTER NOTEBOOK

#### **REQUIRED LIBRARIES FOR PYTHON:**

Numpy

# PROCEDURE:

#### A) Euclidean distance

The mathematical formula for calculating the Euclidean distance between 2 points in 2D space:

$$d(p,q) = \sqrt[2]{(q_1 - p_1)^2 + (q_2 - p_2)^2}$$

## B) Dot Product

$$u=\begin{bmatrix}5\\12\end{bmatrix},\quad v=\begin{bmatrix}8\\6\end{bmatrix}$$
 Dot product is 
$$u\cdot v=u_1\times v_1+u_2\times v_2\\ =5\times 8+12\times 6\\ =112$$

# C) Solving a System of Linear Equations

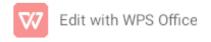
A system of linear equations can be represented in matrix form as AX=B, where A is the matrix of coefficients, X is the column vector of variables, and B is the column vector of solutions. To solve for X, we can use:  $X=A^{-1}$  B assuming A is invertible.

### PROGRAM:

## A) Calculating the Euclidean Distance Between Two Points

importnumpy as np

defeuclidean\_distance(p, q):



1

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returnnp.sqrt(np.sum((q - p) **
2))# Example usage
p = np.array([1, 2])
q = np.array([4, 6])
distance = euclidean_distance(p, q)
print("Output for Calculating the Euclidean Distance Between Two Points is: ",distance)
B) Calculating the Dot Product of Two Vectors
importnumpy as np
A = np.array([1, 3, -5])
B = np.array([4, -2, -1])
dot_product = np.dot(A, B)
print("Output for dot product of two vectors A and B is ",dot_product)
C) Solving a System of Linear Equations
importnumpy as np
# Coefficients matrix A and result
vector bA = np.array([[3, 1], [1, 2]])
b = np.array([9, 8])
# Solve for x
x = np.linalg.solve(A, b)
print("Output solution of System of Linear Equations is ",x)
Output:
A)Output for Calculating the Euclidean Distance between Two Points is: 5.0. Exercise 2
-B)Output fordot product of two vectors A and B is 3
C)Output solution of System of Linear Equations is [2. 3.]
Result:
```



The programs were run successfully