Ex.No-1 **NUMPY**

AIM:

TocalculatethevaluesforthemathematicalformulasusingNumPylibrary

INTEGRATEDDEVELOPMENTENVIRONMENT(IDE)REQUIRED:

JUPYTERNOTEBOOK

REQUIREDLIBRARIESFORPYTHON:

- Numpy

PROCEDURE:

A) Euclideandistance

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) DotProduct

$$u = \begin{bmatrix} 5 \\ 12 \end{bmatrix}, \quad v = \begin{bmatrix} 8 \\ 6 \end{bmatrix}$$

Dot product is $u \cdot v = u_1 \times v_1 + u_2 \times v_2$
$= 5 \times 8 + 12 \times 6$
$= 112$

C) SolvingaSystemofLinearEquations

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

PROGRAM:

A) CalculatingtheEuclideanDistanceBetweenTwoPoints

importnumpy as

npdefeuclidean_distance(p,q):

returnnp.sqrt(np.sum((q-p)**2))#

Exampleusage

p= np.array([1,2])

q= np.array([4,6])

distance=euclidean_distance(p,q)

print("OutputforCalculatingtheEuclideanDistanceBetweenTwoPointsis:",distance)

B)CalculatingtheDotProductofTwoVectors

importnumpyasnp

A=np.array([1,3,-5])

B = np.array([4, -2, -

1])dot_product=np.dot(A,B)

print("Outputfordotproductoftwovectors AandBis",dot_product)

C)SolvingaSystemofLinearEquations

importnumpyasnp

#CoefficientsmatrixAandresultvectorbA=

np.array([[3, 1], [1,2]])

b=np.array([9,8])#

Solvefor x

x=np.linalg.solve(A,b)

print("OutputsolutionofSystemofLinearEquationsis",x)

Output:

A)OutputforCalculatingtheEuclideanDistancebetweenTwoPointsis:5.0.Exercise2–B)Output fordot

productof two vectorsAand Bis3

C)OutputsolutionofSystemofLinearEquationsis[2.3.]

Result:

Theprograms wererunsuccessfully