ASSIGNMENT 1

1. What is NumPy? Why should we use it?

NumPy is a popular Python library used for numerical and scientific computing. It provides a powerful array object, called ndarray, which supports efficient operations on large, multi-dimensional arrays and matrices. NumPy also includes mathematical functions to perform operations on arrays, such as linear algebra, statistical operations, and more.

Why Use NumPy?

- **Performance:** NumPy arrays are more efficient than Python lists, especially when performing mathematical computations on large datasets.
- **Functionality:** Provides extensive support for mathematical and logical operations, Fourier transforms, and random number generation.
- **Convenience:** Simplifies operations on large datasets with vectorization, which allows for concise and readable code.
- **Integration:** Works well with other Python libraries such as pandas, matplotlib, and SciPy, making it ideal for data science and machine learning applications.

2.Write the steps to create 2D, and 3D array with output.

Here's how to create a 2D array (a matrix) with NumPy:

Creating a 2D Array in NumPy

```
import numpy as np

# Creating a 2D array
array_2d = np.array([[1, 2, 3], [4, 5, 6]])
print("2D Array:")
print(array_2d)
```

Output:-

```
2D Array:
[[1 2 3]
 [4 5 6]]
```

Creating a 3D Array in NumPy

For a 3D array, you can specify multiple layers, each containing a 2D matrix:

```
# Creating a 3D array
array_3d = np.array([[[1, 2, 3], [4, 5, 6]], [[7, 8, 9], [10, 11, 12]]])
print("3D Array:")
print(array_3d)
```

Output:

```
3D Array:
[[[ 1  2  3]
  [ 4  5  6]]

 [[ 7  8  9]
  [10 11 12]]]
```

Explanation

- **2D Array:** A collection of rows and columns, resembling a matrix or table structure.
- **3D Array:** An array containing multiple 2D arrays (or matrices), adding an extra dimension for depth.