



**S. B. JAIN INSTITUTE OF TECHNOLOGY,  
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**Practical No. 3**

**Aim:** Develop an application to create a 3x3 matrix with values ranging from 2 to 10 using NumPy.

**Expected Output:**

```
[[ 2 3 4]
 [ 5 6 7]
 [ 8 9 10]]
```

**Name of Student:**

**Roll No.:**

**Semester/Year:**

**Academic Session:**

**Date of Performance:**

**Date of Submission:**

## *Python Programming Lab (PCCCS404P)*

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```
[[ 2 3 4]
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### **OBJECTIVE/EXPECTED LEARNING OUTCOME:**

- To be able to understand the concept of arrays.
- To be able to implement NumPy Library.
- To be able to understand various operation on NumPy array.

### **HARDWARE AND SOFTWARE REQUIREMENT:**

#### Hardware Requirement

- Processor : Dual Core
- RAM : 1GB
- Hard Disk Drive : > 80 GB

#### Software Requirement

- Operating System — Windows 2007 and Ubuntu
- Package used — Python3, Numpy, Pandas, Django
- IDE — Visual Studio, Pycharm
- Editors — Text editor, sublime text
- Online platform — Jupiter, Google co-lab

### **THEORY:**

NumPy is a Python library used for working with arrays. It also has functions for working in domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open-source project and you can use it freely. NumPy stands for Numerical Python. In Python we have lists that serve the purpose of arrays, but they are slow to process.

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NumPy aims to provide an array object that is up to 50x faster than traditional Python lists.

The array object in NumPy is called ndarray, it provides a lot of supporting functions that make working with ndarray very easy. Arrays are very frequently used in data science, where speed and resources are very important.

Data Science is a branch of computer science where we study how to store, use and analyze data for deriving information from it. NumPy arrays are stored at one continuous place in memory unlike lists, so processes can access and manipulate them very efficiently. This behaviour is called locality of reference in computer science. This is the main reason why NumPy is faster than lists. Also it is optimized to work with latest CPU architectures. NumPy is a Python library and is written partially in Python, but most of the parts that require fast computation are written in C or C++.

### **Installation of NumPy:**

If you have Python and PIP already installed on a system, then installation of NumPy is very easy.

```
C:\Users\Your Name>pip install numpy
```

If this command fails, then use a python distribution that already has NumPy installed like, Anaconda, Spyder etc.

### **Import NumPy:**

Once NumPy is installed, import it in your applications by adding the import keyword:

```
import numpy
```

Now NumPy is imported and ready to use.

**Example:** `import numpy arr =`

```
numpy array([1, 2, 3, 4, 5])
```

```
print(arr)
```

### **ALGORITHM:**

- import the NumPy library and alias it as np.
- Create a NumPy array arr using np.arange(start, stop) function with parameters start=2 and stop=11. This generates an array containing integers from 2 to 10.
- Print the original array arr.
- Get the number of dimensions of the original array arr using the .ndim attribute and print it

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- Reshape the original array arr into a 3x3 matrix using the .reshape(rows, cols) function with parameters rows=3 and cols=3.
- Print the reshaped array resh.
- Get the number of dimensions of the reshaped array resh using the .ndim attribute and print it.

FLOWCHART:

CODE:

```
import numpy as np
arr=np.arange(2,11)
print(arr)
print(arr.ndim)
reshp=arr.reshape(3,3)
print(reshp)
print(reshp.ndim)
```

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INPUT & OUTPUT (With Different Test Cases):

```
1  import numpy as n
2  l = []
3  for i in range(2, 11):
4      l.append(i)
5  a = n.array(l)
6  arr = a.reshape(3, 3)
7  print(arr)
8  print("Dimension of the array: ", arr.ndim)
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SERIAL MONITOR

Code + - [ ] [X]

```
PS C:\Users\patil\OneDrive\Documents\Code_Bhuvan> python -u "c:\Users\patil\OneDrive\Documents\Code_Bhuvan\Python Programs\numpy1.py"
[[ 2  3  4]
 [ 5  6  7]
 [ 8  9 10]]
Dimension of the array: 2
PS C:\Users\patil\OneDrive\Documents\Code_Bhuvan> 
```

CONCLUSION:

DISCUSSION AND VIVA VOCE:

- Q.1) What is Numpy?
- Q. 2) List at least 20 Python Libraries with their usage.
- Q. 3) What are the features of Numpy?
- Q. 4) Explain types of Numpy Operations.
- Q. 5) What is Role of Numpy in data Science?
- Q. 6) Explain slicing in Python.

REFERENCE:

- 1. <https://www.youtube.com/watch?v=oHaYdfWlgCg>
- 2. <https://numpy.org/>
- 3. <https://www.tutorialspoint.com/numpy/index.htm>
- 4. [https://www.youtube.com/watch?v=8JfDAm9y\\_7s](https://www.youtube.com/watch?v=8JfDAm9y_7s)