15th October Notes

Creating Multi-Dimensional Arrays

Creating Arrays of Different Dimensions

- **2D Array**

```
arr_2D = np.array([[1, 2, 3],
                   [4, 5, 6],
                   [7, 8, 9]])
arr_2D
```

- **2D Array (Single Row)**

```
arr_2D1 = np.array([[1, 2, 3, 4, 5, 6, 7, 8, 9]])
arr_2D1
```

Checking Array Properties

Check Dimensions

```
arr_2D.ndim
arr_2D1.ndim
```

Check Shape (rows, columns)

```
arr_2D.shape
arr_2D1.shape
```

Check Array Type

```
type(arr_2D)
```

Check Data Type of Elements

```
arr_2D.dtype
```

Row and Column Matrices

Row Matrix

```
row_arr = np.array([[1, 2, 3, 4, 5, 6, 7, 8]])
row_arr.shape
```

Column Matrix

```
col_arr = np.array([[1], [2], [3], [4], [5], [6], [7], [8]])
col_arr.shape
```

Reshaping Arrays

Convert Row Matrix to Column Matrix

```
row_arr.reshape(8, 1)
```

Reshape Examples

```
a1 = row_arr.reshape(4, 2)
a1
```

```
a2 = row_arr.reshape(2, 4)
a2
```

Creating Matrices Using Built-in NumPy Functions

Function	Description
np.zeros()	Creates an array filled with zeros
np.ones()	Creates an array filled with ones
np.eye()	Creates an identity matrix
np.arange()	Creates a range of values
np.random.rand()	Generates random floats between 0 and 1
np.random.randint()	Generates random integers within a range
np.identity()	Creates an identity matrix
np.full()	Creates an array filled with a specific value

Function	Description
np.empty()	Creates an empty array (uninitialized values)
np.linspace()	Generates evenly spaced numbers between a range

Universal Functions in NumPy

Function	Description
np.sqrt()	Square root of each element
np.exp()	Exponential value of each element
np.log()	Natural logarithm of elements
np.sin()	Sine value of elements
np.mean()	Mean of elements
np.median()	Median of elements
np.std()	Standard deviation of elements