***Muhammad Nadeem***

***201980050***

**DS-307-Data Mining Lab**

**Task no 1**

**Write difference between Array, Matrix, Series & DataFrame with examples.**

*Array and Matrix*:

|  |  |
| --- | --- |
| **Array** | **Matrix** |
| A data structure that stores elements of the same data type in contiguous memory locations. | A specific type of 2D array with operations defined for linear algebra. |
| It Can be one-dimensional or multi-dimensional. | Specifically a 2D structure. |
| Supported in various programming languages, with NumPy providing support in Python. | Supported in NumPy, and operations like matrix multiplication are defined. |
| Supports element-wise operations. | Supports element-wise operations. |
| General matrix operations might not be well-defined. | Well-defined matrix operations like multiplication. |
| **import numpy as np**  **arr\_1d = np.array([1, 2, 3])**  **arr\_2d = np.array([[1, 2, 3], [4, 5, 6]])** | **import numpy as np**  **matrix = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])**  **result = np.dot(matrix, matrix)** |

*Series and DataFrame*:

|  |  |
| --- | --- |
| **Series** | **DataFrame** |
| One-dimensional | Two-dimensional |
| Like a single column in a spreadsheet | Like a spreadsheet with multiple columns |
| Created from a list or array | Created from a dictionary or 2D array |
| Single index (e.g., numeric or labels) | Can have row and column indices |
| Element-wise operations | Operations can be applied to entire columns |
| **pd.Series([1, 2, 3, 4])** | **pd.DataFrame({'A': [1, 2, 3], 'B': ['x', 'y', 'z']})** |