**Numpy Practice Worksheet**

**Array Creation**

\*\*Exercise 1.1:\*\* Create the following arrays:

- A 1D array of numbers from 0 to 9.

- A 3x3 array of zeros.

- A 4x4 identity matrix.

- An array of 10 numbers between 0 and 1 (inclusive).

**Indexing and Slicing**

\*\*Exercise 2.1:\*\* Given the array `[10,20,30,40,50]`, extract:

- The first element

- The last element

- Elements from index 1 to 3 (inclusive)

- Reverse the array

**Array Operations**

\*\*Exercise 3.1:\*\* Let `a = [1,2,3]` and `b = [4,5,6]`. Compute:

- Element-wise sum

- Element-wise product

- Dot product

- Square of each element in `a`

**Broadcasting**

\*\*Exercise 4.1:\*\* Use broadcasting to add `[1,2,3]` to each row of a 2x3 matrix of ones.

**Statistics**

\*\*Exercise 5.1:\*\* For the array `[1,2,3,4,5]`, compute:

- Mean

- Standard deviation

- Min and Max

- Unique values

**Linear Algebra**

\*\*Exercise 6.1:\*\* For matrix `[[1,2],[3,4]]`, compute:

- Determinant

- Inverse

- Eigenvalues and Eigenvectors

**Random Numbers**

\*\*Exercise 7.1:\*\* Generate:

- 5 random numbers between 0 and 1

- 5 random integers between 1 and 10

- 5 numbers from a normal distribution (mean=0, std=1)

**Performance Timing of Python Loop vs Numpy**

* Randomly generate an array of 100 elements and store in arr.
* Multiply arr \* 10 and store result in arr
* Measure the time it takes to execute multiplication
* Compare the result