Lab 2a - NumPy Arrays

1. Creating Arrays

- Create the following arrays:
  - A 1D array: `[2, 4, 6, 8, 10]`
  - A 2D array:

```
[[1, 2, 3],
 [4, 5, 6]]
```

  - A 3D array:

```
[[[1,2], [3,4]],
 [[5,6], [7,8]]]
```

- Generate:
  - An array of 10 zeros
  - An array of 5 ones
  - Numbers from 5 to 25 with a step of 5
  - 6 equally spaced values between 0 and 1

2. Array Join, Split, Search, Sort

- Given `a = [10, 20, 30]` and `b = [40, 50, 60]`:
  - Join them into a single array.
  - Split the resulting array into 3 equal parts.
- For `arr = [15, 25, 35, 25, 45]`:
  - Find all indices where the element is `25`.
- For `arr = [12, 5, 18, 7, 3]`:
  - Sort the array in ascending order.

3. Indexing, Slicing, Iterating

- For the matrix:

```
[[11, 12, 13],
 [21, 22, 23],
 [31, 32, 33]]
```

  - Extract the element `22` using indexing.
  - Slice the first two rows.
  - Slice the last column.
  - Iterate through all elements and print them one by one.

4. Copying Arrays

Given `arr = [1, 2, 3, 4, 5]`:

- Create a view of this array and change the first element to `99`. Show how it affects the original array.
- Create a deep copy of this array and change the second element to `77`. Show how the original array remains unchanged.

5. Array Shape Manipulation

For `arr = np.arange(1, 13)`:

- Reshape it into a 3×4 matrix.
- Flatten the reshaped matrix into 1D.
- Resize it into a 2×8 matrix.

6. Identity Array and Eye Function

Generate:

- A 5×5 identity matrix.
- A 4×6 matrix using `eye()` with diagonal offset `k=2`.