CS2105: Data Structures and Algorithms with Java

Lab 1: Arrays [1 Mark]

1. Statement Purpose:

Purpose of this Lab is to familiarize the students with the use of elementary data structure Arrays and the implementation of the linear search algorithm. The students are given small tasks related to arrays which they complete during the lab session under the supervision of the lab instructor. This helps them understand the concepts well which they learn in their lectures.

2. Activity Outcomes:

After the completion of this lab, the student should be able to:

- Access and modify elements within an array.
- Traverse arrays using loops.
- Implement and understand the linear search algorithm.

3. LAB EXERCISE

1. Create a new project named Lab1_Arrays. Inside this project, create a main class named ArrayExercises.
2. In the ArrayExercises class, **perform the following operations**:

   - Initialize an array with random values (between 0 and 99). [CLO 1.2]

```
for(int i = 0; i < array.length; i++) {
    array[i] = (int) (Math.random() * 100);
    System.out.print(array[i]+ " ");
}
```

   - Calculate the average of all elements in the array and display how many elements are below and how many are above this average.[CLO 2.1]
   - Find and swap the largest and smallest elements in the array. [CLO 2.1]
   - Search for an element in the array using the linear search approach. If found, print its index.[CLO 2.3]

Sample Run:

```
run:
Array elements: 37 54 52 26 51 7 0 93 82 84

Average:48.6
Elements below average: 4
Elements above average: 6

Array after swapping largest and smallest elements:
37  54  52  26  51  7  93  0  82  84

Enter a number to search: 82
Element found at index: 8

BUILD SUCCESSFUL (total time: 6 seconds)
```