Assignment 01

(Submit your assignment as a text file, Java, Python, C/C++ file or Jupyter Notebook file)

1. (10 points) Write an example for each of the following. Avoid using examples that were already discussed in class. Examples do not necessarily have to be programming related:

- O(1)
- O(log n)
- O(n)
- O(n log n)
- O(n2)

For the following questions, use either Java, Python, C/C++.

2. (30 points) Write code to populate an array with the size n with numbers from 0 to n-1. Next, shuffle (randomly reorder or rearrange) the numbers in the array.

Avoid using shuffle() method/function. However, feel free to use the built-in random() function.

And finally, provide the Big O notation for both the average and worst case time complexities of your code.

3. (30 points) Write a function that accepts a sorted array of integers and a target value. The array may contain duplicate values. It should return the count of the number of occurrences of the target value.

Full credit for a O(log n) solution and partial credit otherwise.

4. (30 points) Write a function to return the index of the largest value in a sorted, rotated array. Assume that the array is sorted in ascending order. A rotated array is an array that has had its elements shifted or rotated circularly to the left or right by a certain number of positions. This rotation does not change the elements themselves but changes their positions within the array.

Examples:
[1, 2, 3, 4, 5] -> [4, 5, 1, 2, 3] # max value index: 1 (value: 5)
[0, 1, 3, 5, 7, 11] -> [5, 7, 11, 0, 1, 3] # max value index: 2 (value: 11)

Full credit for a O(log n) solution and partial credit otherwise.