United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid assessment Assignment 1: Summer 2024
Course Code: CSE 2215, Course Title: Data Structures and Algorithms 1
Total Marks: 10   Deadline: 18.09.24

1. Apply Quick Sort to the given array to sort it in Descending order. You must demonstrate each step of the simulation in detail. Choose the pivot strategy that is most likely to achieve the best-case scenario for the following array:

   Array: 20 33 41 55 56 60 61 70

2. Imagine you are a librarian who needs to organize a small stack of returned books on a shelf. The books are initially in a random order. You decide to use the Insertion Sort algorithm to sort the books by their titles.
   Given that you often add one book at a time to the already sorted section of the shelf, explain how the time complexity of Insertion Sort makes it a suitable choice for this task. Additionally, compare its performance in the best-case scenario versus the worst-case scenario when sorting the stack of books. Provide examples to illustrate your explanation.

3. In a magic land, numbers are sorted in a special order. You need to find the magic number 77 in the following sorted list of numbers: [1, 4, 7, 13, 26, 37, 50, 62, 77, 88, 99]. You can use either linear search or binary search. But beware, if you use more than 3 steps, the spell will break! Which search method will you choose, and can you find the number in 3 steps or less?

4. Find the memory location of A[15][45] if loc(A[5][15])=4500. Assume row-wise memory is allocated in the double type array A[60][60], where each double data is 8 bytes.