LEBANESE AMERICAN UNIVERSITY

School of Arts and Science

Department of Computer Science and Mathematics

CSC 310: Algorithms and Data Structures

Lab 4

**The following input/output sample is applied to questions 1**

|  |  |
| --- | --- |
| Sample Input | Sample Output |
| 3 | -732 9 12 34 156 237 700 |
| 7 | -20 0 1 5 |
| 12 700 9 156 34 -732 237  4  5 -20 0 1  5  2 2 -10 8 9 | -10 2 2 8 9 |

Problem 1 – *Quick Sort:*

Given an array of integers, write a program that sorts the array using Quick sort

Problem 2 – *Heap Class*:

Write a Heap Class that contains an ***insert*** method, which takes as an input an integer value and adds it to the heap maintaining the heap’s properties, and a ***printHeap*** method that will print the heap’s array.

The insert method should handle the heap’s property of keeping the node value less than its parent’s value. (Max heap strategy)

The first element of input is an integer N representing the number of test cases. The first integer K of each test case represents the size of the heap and it will be followed by K numbers that will be filled in the heap.

|  |  |
| --- | --- |
| Sample Input | Sample Output |
| **2**  **7** 25 13 10 30 15 27 37  **4** 6 7 8 9 | 37 25 30 13 15 10 27  9 8 7 6 |

Problem 3: Assignment

By Sunday, you are expected to submit a report about a race between Quick sort, Heap sort, Merge sort, Hybrid Merge-insertio. The running time of each algorithm must be recorded, and a small comparison between the algorithms is to be made (the conclusion would suffice). Don’t forget to attach the .java files (the code of the all the sorting problems) with the report. (Note: It’s very important to have a large number of lists exhibiting all the scenarios: average & worst case for each algorithm)

* Send it before midnight of the October 11 (sunday) by email to Ali and Salma with the SUBJECT: “Assignment2\_CSC310Lab4”.