Assignment 1

Course : Data Structure

Submission Deadline: 23/02/2021

1) Design an algorithm that takes:
   • An array containing n distinct natural numbers
   • A number $k \leq n$
   and calculates the sum of the k largest numbers in the array.
   For example, if the array is {3, 7, 5, 12, 6} and $k = 3$, then the algorithm should return 25 (12+7+6).
   You may freely use standard data structures and algorithms.
   You should say what design or existing data structure you have chosen, And write down your algorithm as **pseudocode**.
   your algorithm should take O(n log n) time.

2) Design a data structure for storing a set of integers. It should support the following operations:
   - new(): create a new, empty set
   - insert(x): add an integer x to the set
   - member(x): test if a given integer x is in the set
   - increaseBy(x): add x to all the integers in the set

   For example, calling increaseBy(2) on a set containing the values 1,2,3,4,5 should give a set containing the values 3,4,5,6,7.

   You may freely use standard data structures and algorithms.
   You should say what design or existing data structure you have chosen, and give **pseudocode** for each of the operations.
   The operations must have the following time complexities:
   O(1) for new,
   O(log n) for insert/member,
   O(n) for increaseBy
   (where n is the number of elements in the set)