

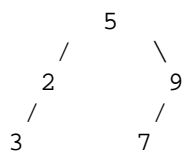
American University of Armenia
CS121, Data Structures
PSS 12

SortedTableMap

1. Given an array of integers, sort the elements by the floor of the mean value of their digits using SortedTableMap. Assume that there are no two numbers in the array with the same mean floor value of digits.
Exmample:
Unsorted array: [789, 256, 111]
Sorted array: [111, 256, 789]
2. Write a method mostFrequentWords() that given an array of Strings, a Character comparator and an integer n returns n most frequent words in alphabetical order of their first characters using SortedTableMap. (If two words have the same frequencies override the value of the previous one with the new one)
Example:
Initial array: [bb, a, ccc, a, dddd, a, ccc, dddd, ccc, a]
N = 2
Final array: [a, ccc]

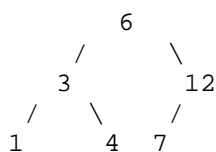
Binary Search Tree

1. Describe a modification to the binary search-tree data structure that would support the following two index-based operations for a sorted map in $O(h)$ time, where h is the height of the tree
 - atIndex(i): Return the position p of the entry at index i of a sorted map.
 - indexOf(p): Return the index i of the entry at position p of a sorted map.
2. Write a method getMinKey() that will return the smallest search key in a Binary Search Tree.
3. Write a method that given two Keys and a Binary Search Tree finds the minimum distance between two nodes with given two keys (Note: minimum distance between two nodes is the number edges between the two keys)
Example:



Keys: 3 and 7
Distance: 4

4. Write a method that given integer number n , finds the greatest key in the binary search tree that is less than or equal to n (if there is no such number return -1).
Example:



$n = 9$
Returns: 7

AVL

1. Consider a tree T storing 100,000 entries. What is the worst-case height of T in the following cases?
 - T is a binary search tree.
 - T is an AVL tree.
2. Show the result of adding 60, 50, 20, 80, 90, 70, 55, 10, 40, 35 to an initially empty
 - AVL tree
 - binary search tree

Show the result of removing

- 50, 60, 55 in the given order from resulting AVL tree
- 50, 60, 55 in the given order from resulting binary search tree