Problem 1 [20 points] Time Complexity of Heap Building

The time complexity of turn sized-n array A into a binary heap on S via root-fix operator on dynamic array is O(n), where A stores the values in set S.

Problem 2 [20 points] Height of Balanced Binary Search Tree

A balanced binary search tree with n nodes has height O(log n).

CS203 DSAA Fall 2021 Quiz 2

Problem 3 [30 points] Huffman Encoding

Given (character, frequency) pairs as following:

H	N	S	O	E	Y	T	D
14	16	8	12	30	18	43	65

(a) Show the detail steps of building its Huffman tree, i.e., draw the Huffman tree building process step by step

(b) Write down the corresponding scheme of the Huffman tree you obtained in (a), you only need draw a table, which contains two columns, the left is the character, the right is its corresponding Huffman coding

(c) Write down the corresponding codes of string "HONESTY".

Problem 4 [30 points] AVL-Tree

Let us define a binary search tree as following:

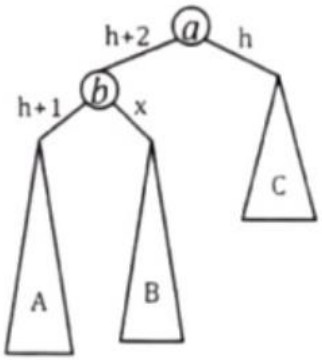

Figure 1. left-left case

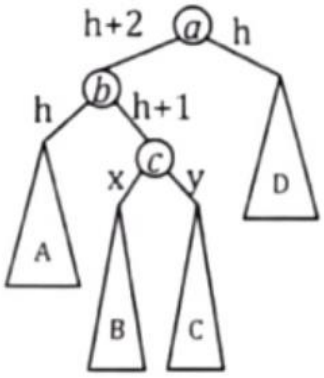

Figure 2. left-right case

(a) Given the imbalance node a in Fig. 1, after remedied the imbalance node a,

a→leftchild = _____, a→rightchild = _____,

b→leftchild = _____, b→rightchild = _____,

(b) Given the imbalanced node a in Fig. 2, after remedied the imbalanced node a,

a→leftchild = _____, a→rightchild = _____,

b→leftchild = _____, b→rightchild = _____,

c→leftchild = _____, c→rightchild = _____,

(c) Draw the corresponding balanced binary search tree of Figures 1 and 2.

(d) Given the following imbalance BBST, please draw the balanced BBST after remedy