

Assignment 4

5 – Points

Assigned: 1st April 2024

Deadline: 8th April 2024

CS 2124: DATA STRUCTURES
Spring 2024

Assignment 4

(Assignment has 2 Parts)

- Students should submit a zip file containing all .c and .h with the PDF file (1 PDF file containing output of all part of the assignment) on the Canvas.
 - Kindly do not include .exe files of the work as it is tagged as virus by Canvas
- Assignment must be uploaded on Canvas by the due date to receive credit.
- Kindly **do not email** the assignment as graders can only access your assignment on Canvas.
- Late work will be penalized with points deduction (As mentioned on the outline). The only exception will be documented, extenuating circumstances and these must be communicated prior to the due date or submission of the work.
- **Note:** Canvas uses 11:59:00 p.m. as the cutoff time, and not 11:59:59 p.m.
- **Recommendation:** Don't submit work so close to the deadline that you have to worry about bandwidth issues, Canvas issues, or discrepancies in your system clock and the Canvas clock. These will not be considered extenuating circumstances

AVL Tree (3 – Points)

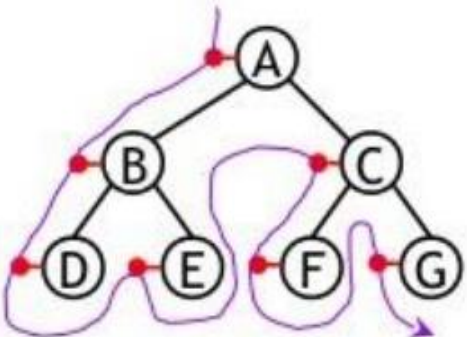
- Write a program that will have pre defined input as numbers (1,2,3,4,5)
- Then program will first create a BST of the input and print that out
- Then the program will balance the BST and print out the AVL tree (pre-order)

Steps

- Create BST (0.5-point)
- Balance the tree (i.e. AVL tree) (0.5-point)

Output:

- Print BST Pre-order (1-point)
- Print Balanced-AVL Pre-order (1-point)



Pre-order

1. Root,
2. Left Subtree,
3. Right Subtree

Building Huffman Tree using Heap (2 – Points)

- Write a code to generate Huffman Encoding (Variable Bit) using Heap.
- The characters and their frequency can be seen in the output screen shot and in the Tables 1 & 2
- Despite the different variable bit coding (i.e. Table – 1 & Table – 2) the total bits are the same
- Include the Table for Total Bits in your PDF file with the output screenshot

Char	Code	Freq	Bits = Code*Freq
a	110	5	15
b	111	9	27
c	00	12	24
d	01	13	26
e	10	16	32
Total Bits			124

Table - 1

Char	Code	Freq	Bits = Code*Freq
a	100	5	15
b	101	9	27
c	00	12	24
d	01	13	26
e	11	16	32
Total Bits			124

Table - 2

```
Huffman Encoding (Variable Bit)
Char | Freq
a    | 5
b    | 9
c    | 12
d    | 13
e    | 16
-----
c: 00
d: 01
a: 100
b: 101
e: 11
```