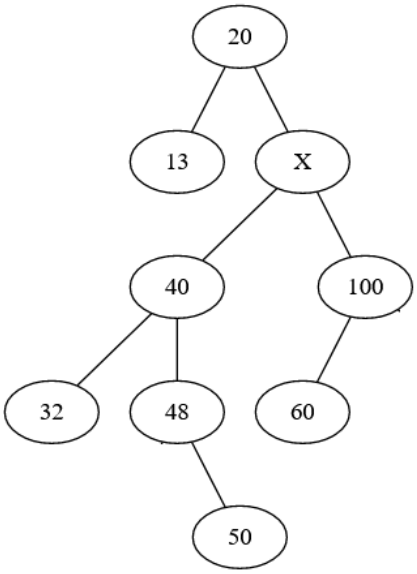
Started on	Sunday, 25 May 2025, 6:33 PM
State	Finished
Completed on	Sunday, 25 May 2025, 6:39 PM
Time taken	5 mins 17 secs
Marks	4.00/4.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Consider the BST below. What value can be in the node marked with X?



- [ ] 43
- [ ] 22
- [x] 52
- [x] 55
- [ ] 45
- [ ] 70

Your answer is correct.

Main rule of the BST is that for every node all elements on the left have to be less than and all elements on the right have to be greater than. So X has to be between the maximum on the left (50) and minimum on the right (60)

The correct answers are:
52,

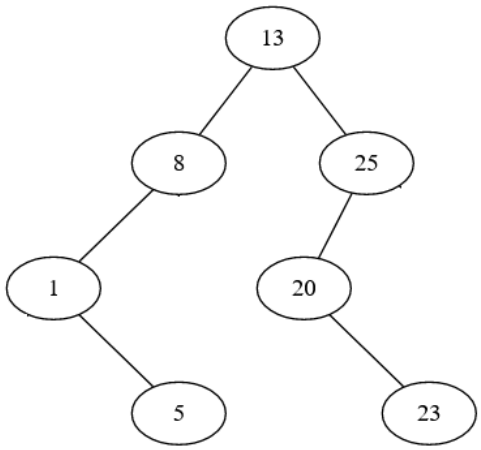
55

Question **2**

Correct

Mark 1.00 out of 1.00

In what order could the elements of the following BST have been inserted?



- [ ] 13 8 5 1 25 20 23
- [x] 13 25 20 8 23 1 5
- [x] 13 25 8 20 23 1 5
- [ ] 13 8 1 5 20 23 25
- [ ] 1 5 8 13 20 23 25

Your answer is correct.

When inserting the elements you never change the existing nodes, you always add a leaf node. So no node could have been inserted before any of its parents.

The correct answers are:
13 25 8 20 23 1 5,

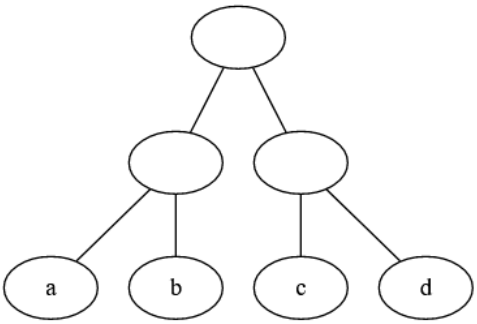
13 25 20 8 23 1 5

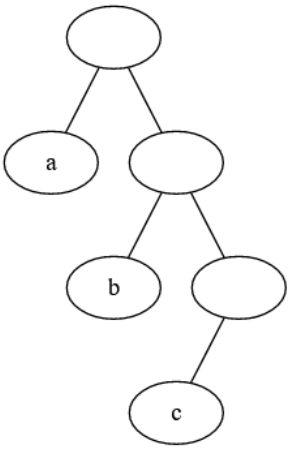
Question **3**

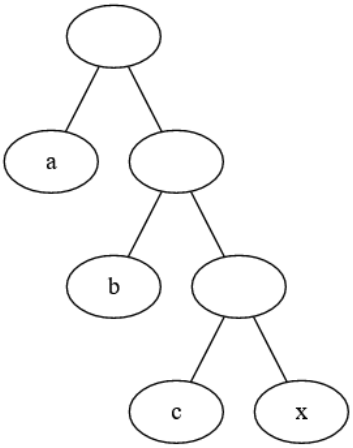
Correct

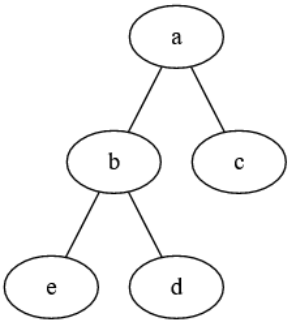
Mark 1.00 out of 1.00

Which of the following trees could represent the tree build for Huffman encoding?



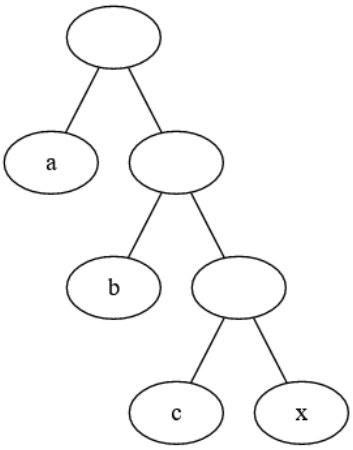


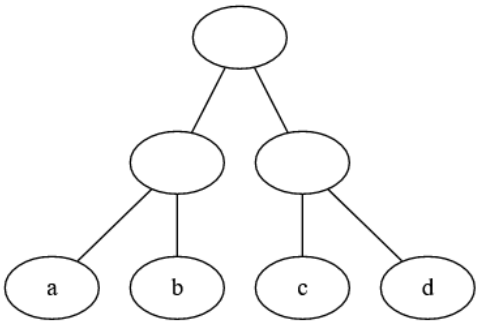




Your answer is correct.

The correct answers are:


a
b
c
x

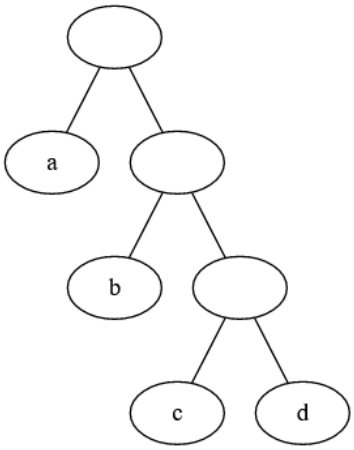

a
b
c
d

Question **4**

Correct

Mark 1.00 out of 1.00

Consider the Huffman encoding tree below built for an alphabet of 4 characters ('a', 'b', 'c', 'd'). Based on the built tree, which character has the highest frequency?



- It cannot be decided based on the tree
- a ✔
- c
- b
- d
- either c or d

Your answer is correct.

Reasoning1: Huffman encoding assigns shorter codes to more frequent characters, and in the tree the shortest code will be assigned to 'a', so 'a' has the highest frequency.

Reasoning2: The only way to build this tree was to first merge c and d (call the result tree1), then tree1 was merged with b (call the result tree2) and finally tree3 was merged with a. And we know that at each step the two trees with the lowest frequency are merged. So initially c and d were the two trees with the lowest frequency. After merging them, we had 3 trees: a, b and tree1. Since b and tree1 were merged at the next step, it means that their frequency was smaller than the frequency of a => a has the highest frequency.

The correct answer is:
a

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