PA 6 Part 1: BST Worksheet

DSC 30 Fall 2023

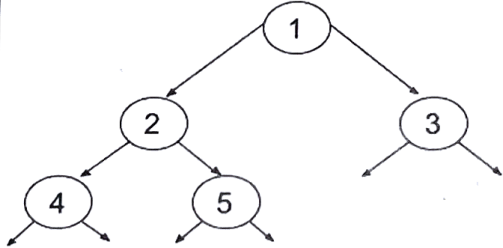| Name	Lin Tian
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First, you will perform several operations by hand so that you become familiar with the BSTs before coding them. For each part you should have solutions in two forms: hand-written and Java function (similar to the PA5 part 1).
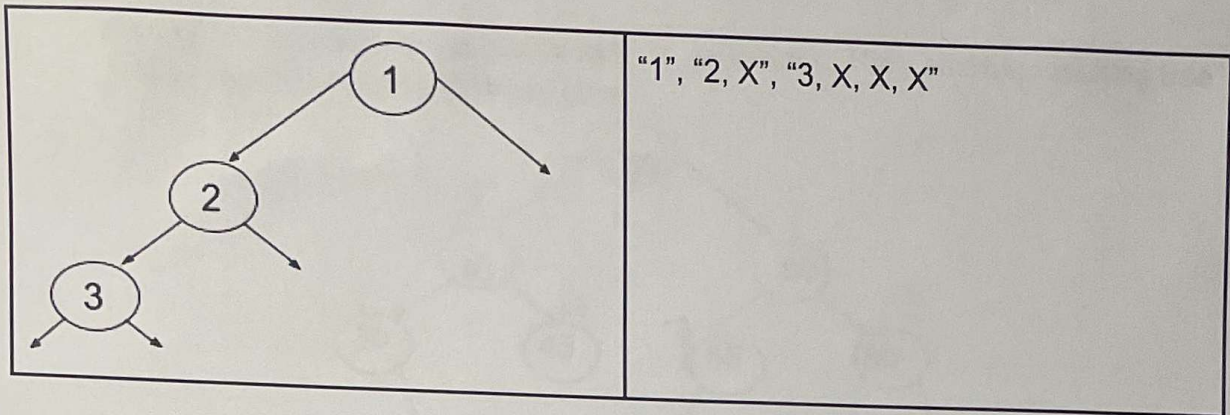
To represent a BST as a set of strings, you should treat each level as one string with the appropriate number of nodes per level.

- 1 node per level (level 0)

- 2 nodes per level (level 1)

- 4 nodes per level (level 2)
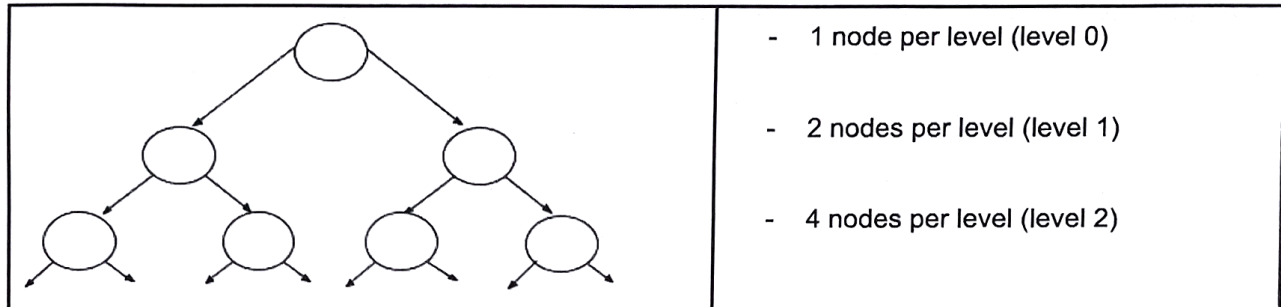
If the node is missing in a level, then use X to represent the missing node.

For example,

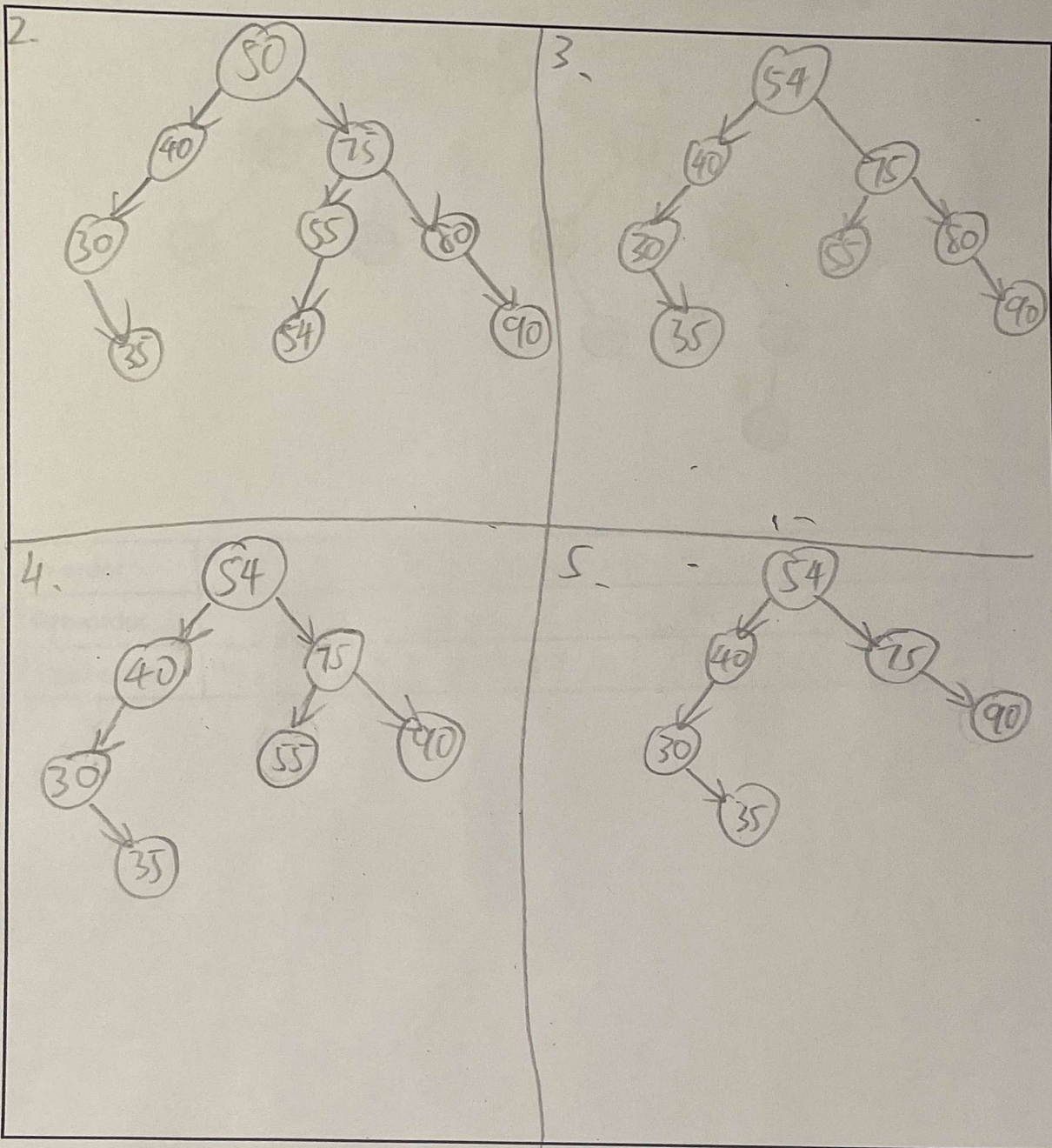| Binary Tree	Corresponding representation
	"1", "2, 3", "4, 5, X, X"

	"1", "2, X", "3, X, X, X"

1. **Insert** the following integers in the order presented to an empty BST. Then draw the BST after these insertions in the box below, and then add it in a string format to BSTManual.java. You don't need to show each step. Your Java answer should "mimic" your drawing.

[100, 10, 50, 40, 45, 25, 101, 160, 125]
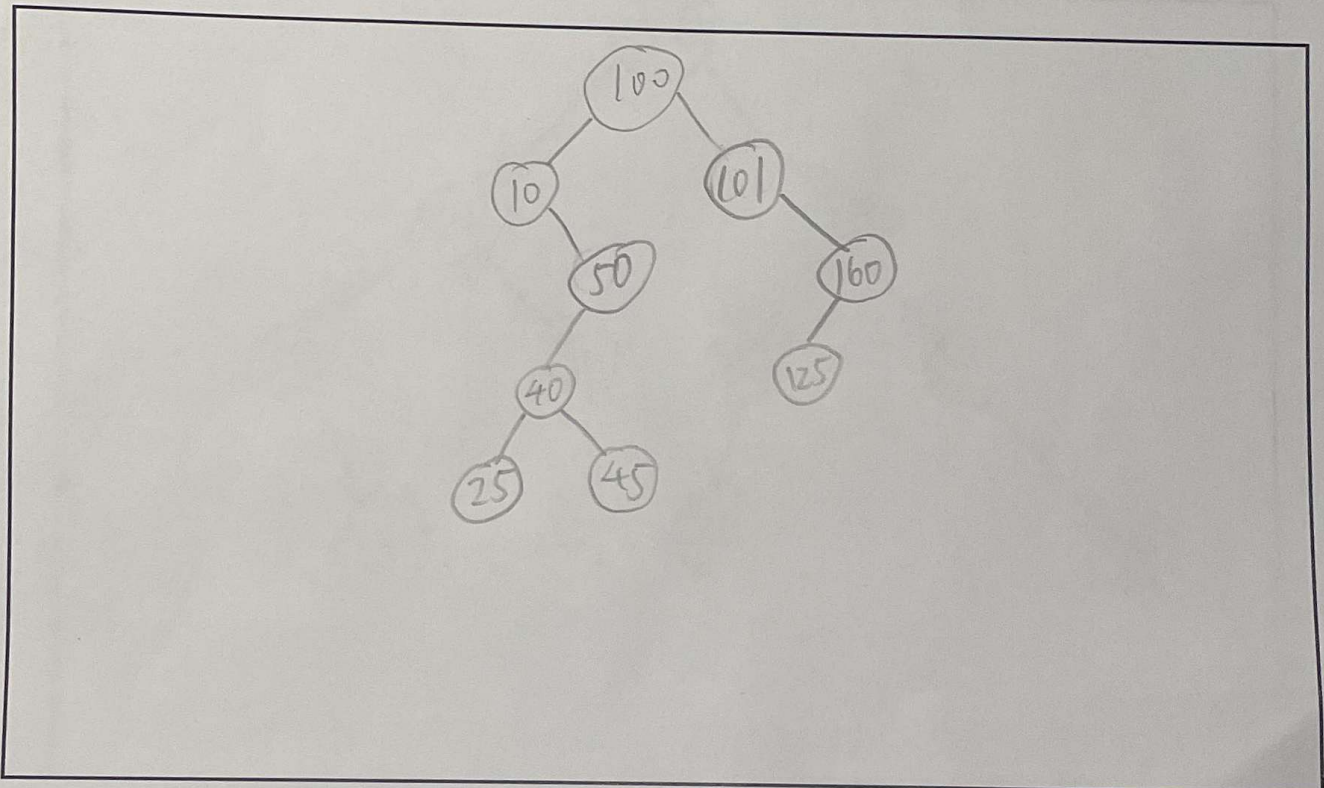
2. **Remove** the following integers in the order presented from the given BST and show each step of removal by drawing the BSTs after each step of removal in the box below (i.e. 5 trees in total). When removing a node with 2 children, you must

2.

Binary tree with root 50, left child 40, right child 75. 40 has left child 30 which has right child 35. 75 has left child 55 (with right child 54) and right child 80 (with right child 90).

3.

Binary tree with root 54, left child 40 (left child 30 with right child 35), right child 75 (left child 55, right child 80 with right child 90).

4.

Binary tree with root 54, left child 40 (left child 30 with right child 35), right child 75 (left child 55, right child 90).

5.

Binary tree with root 54, left child 40 (left child 30 with right child 35), right child 75 (right child 90).

3. Write down the in-order, pre-order, and post-order traversal output of the following BST, then also add your answer to BSTManual.java in a string format: (number, comma, space, number, comma, space etc, like this: "66, 77, 88"
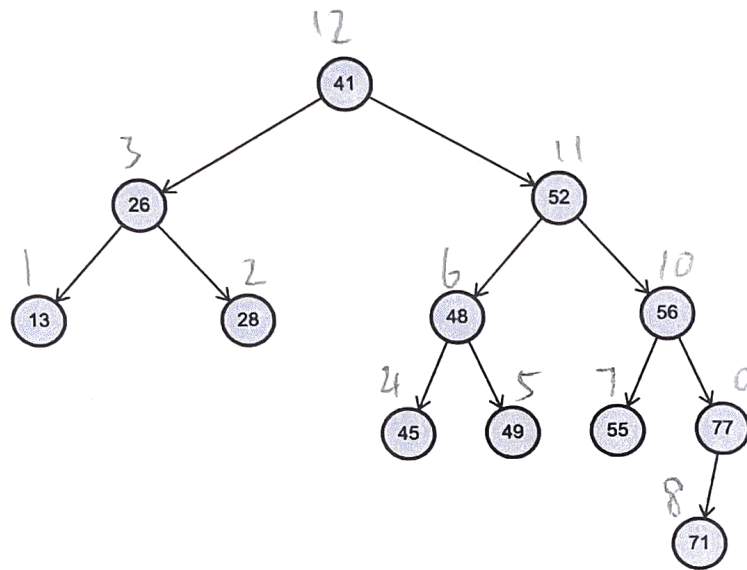
In-order	"13, 26, 28, 41, 45, 48, 49, 52, 55, 56, 71, 77"
Pre-order	"41, 26, 13, 28, 52, 48, 45, 49, 56, 55, 77, 71"
Post-order	"13, 28, 26, 45, 49, 48, 55, 71, 77, 56, 52, 41"