✓ **Congratulations! You passed!**
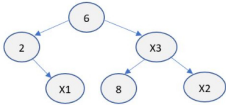
Grade received 88.88%	**Latest Submission** Grade 88.89%	**To pass** 80% or higher	Go to next item

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1. Consider the following binary search tree below with missing values $X1$, $X2$ and $X3$.

    Note that the leaves labeled NIL are not shown, but please assume that they exist.

    0.833333333333334 / 1 point

    Select all true statements about the tree.

    ☐ $X1$ can be any value less than or equal to 6.

    ☑ $X1$ can be set to the number 5 while remaining a valid binary search tree.

    ✓ **Correct**
    $X1$ must also be ≥ 2 since it is the right child of 2, and $X1 \leq 6$ since it is in the left subtree of the root 6. Therefore, 5 is a possible value.

    ☐ $X3$ can be any number ≥ 6.

    ☑ $X3$ can be any number ≥ 8 and $\leq X2$.

    ✓ **Correct**
    Correct

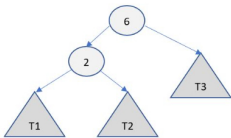   ☑ $X2$ must have a value ≥ 8 and $\geq X3$.

    ✓ **Correct**
    Correct

    ☐ The height of the root node is 3.

    You didn't select all the correct answers

2. Consider the following binary search tree with subtrees shown below. Select all true statements about it.

    0.833333333333334 / 1 point

    ☑ Every node in $T1$ must have value ≤ 2.

    ✓ **Correct**
    Correct since T1 is the left subtree of node 2.

    ☑ Every node in $T2$ must have key ≥ 2 and ≤ 6.

    ✓ **Correct**
    Correct since T1 is in the right subtree of node 2 and left subtree of the node 6.

    ☐ If the node with key 25 is found in the tree, we will find it in subtree $T2$.

    ☐ If the node with key -10 is to be found in the tree, it can be found in subtree $T2$.

    ☑ If the node with key 7 is to be found in the tree, it will be found in $T3$.

    ✓ **Correct**
    Correct since 7 > 6 it will be found in the right subtree of the root node 6.

    ☐ If the height of subtree $T1$ is 4 and that of subtree $T2$ is 2 then the height of node labeled 2 is 5.

    You didn't select all the correct answers

3. Select all correct statements from the list below about binary search trees.

    1 / 1 point

    ☑ In a fully balanced binary search tree with n total nodes (internal and leaf nodes), where $n = 2^k - 1$ for some k, we will have $(n+1)/2$ leaves.

    ✓ **Correct**
    Correct. Think of a BST with 7 nodes, 1 root, 2 children of the root, 4 leaves. Generalize the pattern to a BST with $2^k - 1$ nodes

    ☑ In the worst case, a binary search tree with n internal nodes can have height n.

    ✓ **Correct**
    Correct. Every node in the tree has a single child in the worst case

    ☐ Assuming that all keys are distinct, the key at the root is the median among all keys of the binary search tree.