Review Questions

1. A binary search tree is a variant of binary tree in which all the nodes in the left sub-tree have a value less than that of the root node and all the nodes in the right sub-tree have a value either equal to or greater than the root node.

2. Searching operation : It is used to find whether a given value is present in the tree or not. It first checks if the binary search tree is empty. It it is empty, the algorithm will terminate. However, if there are nodes in the tree, then search function checks to see if the key value of the current node is equal to the value to be searched. If not, it checks if the value is less than the value of the current node, in which case it should be recursively called on the left child node. In case the value is greater than the value of the current node, it should be recursively called on the right child node.

Inserting opertation : we find the correct position where the insertion has to be done and then add the node at that position. It is similar to the search function. After using the search algorithm to determine where the given value will go, if the given value is greater than the current node value, put it on the right and if it is small, put it on the left.

Deleting operation : The method of deleting a node can be divided into three cases. case1-Deleting a node without a first child, case2-deleting a node with a second child, case3-deleting a node with two third children.

case 1: Simply delete the node.

case 2: Replace the node with its child.

case 3: Replace the node's value with its in-order predecessor (largest value in the left sub-tree) or in-order successor (smallest value in the right sub-tree).
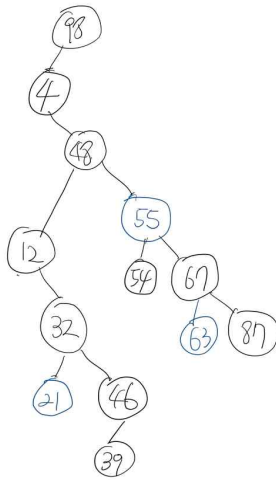
3. Higher heights are slower because there are more things to consider. In particular, if the reason for the increase in height is that the shape of the tree is biased to one side, the time complexity becomes O (n).

4. 58 nodes are used to construct a complete binary tree. Height of tree will be 6.

11.

(a)
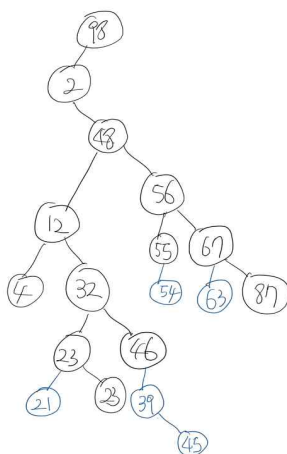
(b)

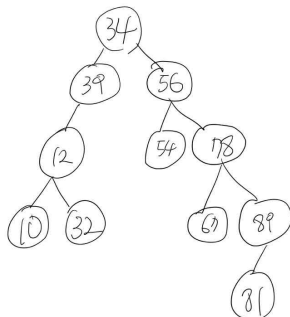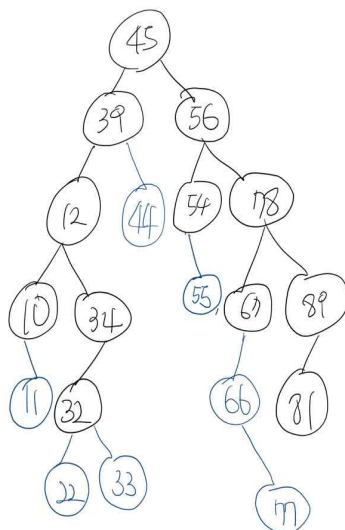

12.
1)
pre-order 45 39 12 10 34 32 56 54 78 67 89 81
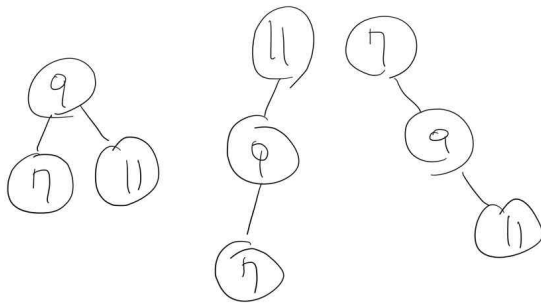in-order 10 12 32 34 39 45 54 56 67 78 81 89
post-order 10 32 34 12 39 54 63 81 89 78 56 45
2)

3)

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Multiple-choice Questions
1. (a)

True or Flase
1. T
2. F
3. F
4. T