

## WRITTEN ASSIGNMENT | BST, AVL, B+ Tree

### Problem 1: Binary Search Tree[30pts]

- (a) Show the final binary search tree of inserting a sequence of numbers 43, 27, 52, 93, 19, 92, 6, 65, 29, 72 into an empty binary search tree. You are not required to write intermediate trees.
- (b) Based on the BST in 1a, draw the final binary search tree after deleting the root.
- (c) Show the result of pre-order, in-order and post-order traversal of the result in 1a.

### Problem 2: AVL Tree [30pts]

Insert a sequence of numbers {51, 54, 18, 39, 23, 9, 47, 22, 57, 65} to an empty AVL tree. Please show intermediate AVL trees.

### Problem 3: B+ Tree [40pts]

In this question, we use a B+ tree with  $M = L = 3$ . We use the definition of  $M$  and  $L$  described in the lecture slides. The initial B+ tree is shown below.

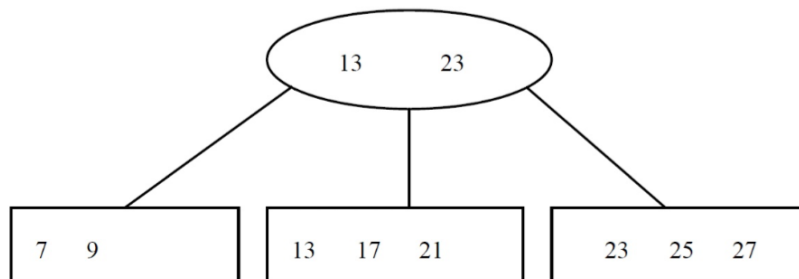


Figure 1: The initial B+ Tree

- (a) Suppose a regular leaf node currently contains  $x$  pieces of records, what are the possible values of  $x$ ?
- (b) Given an insertion sequence {11, 28, 15, 2, 6}, show the B+ tree after each insert.
- (c) Given a deletion sequence {7, 13, 9, 25, 23} which works on the initial B+ tree, show the B+ tree after each deletion.