Title: Heaps

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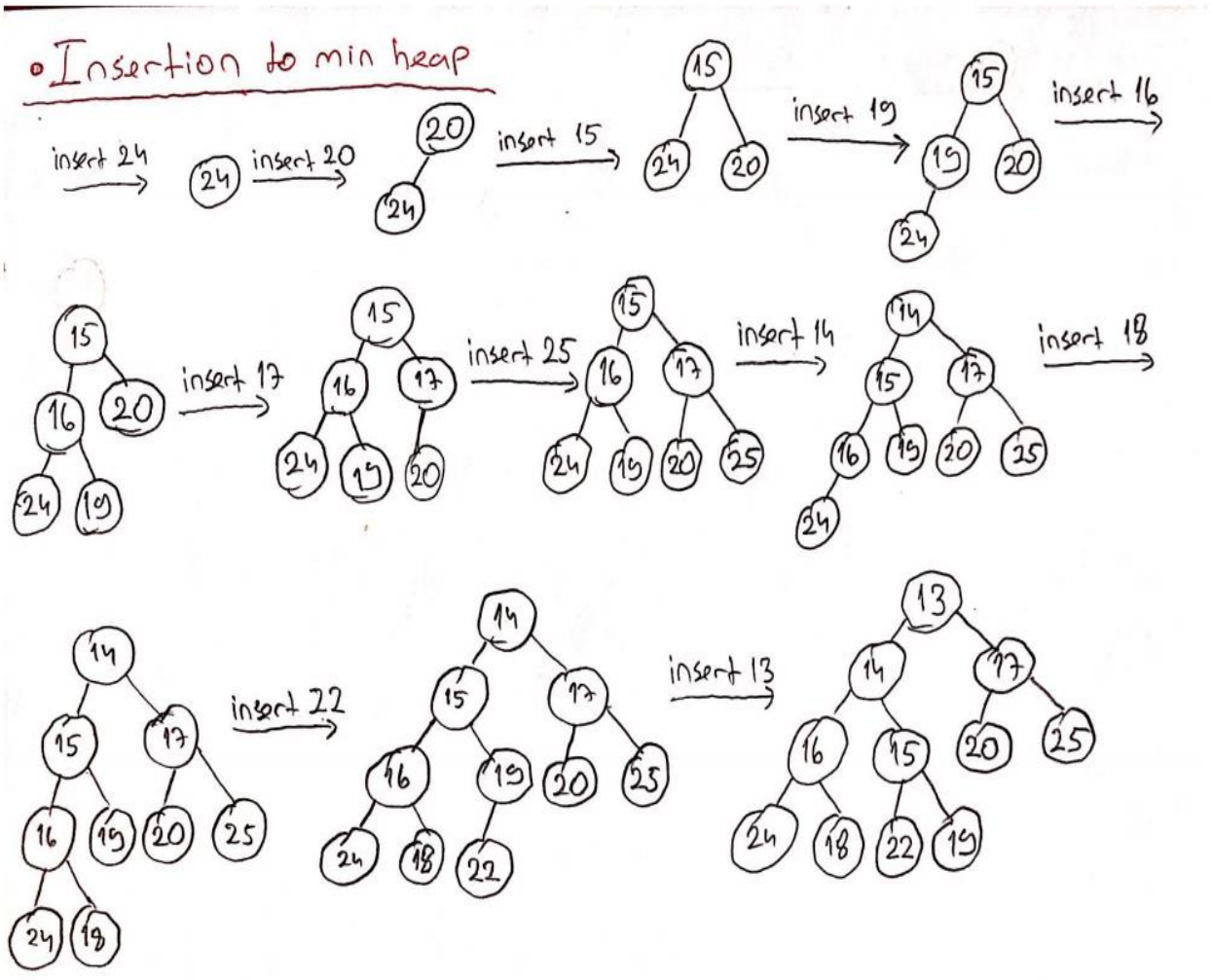
Section: 1

Assignment: 3

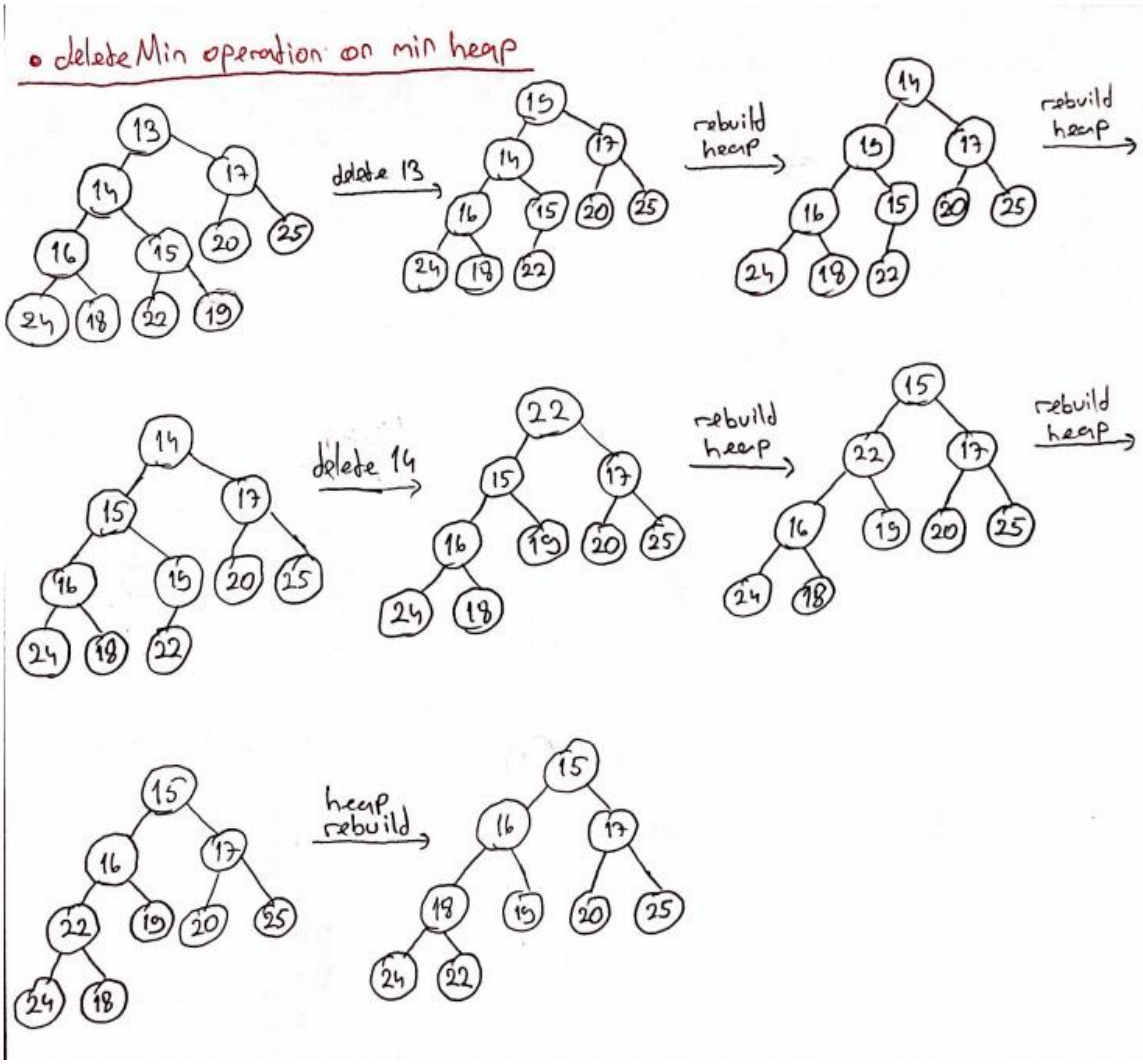
Description: Answers for Q1 and Q3

QUESTION 1

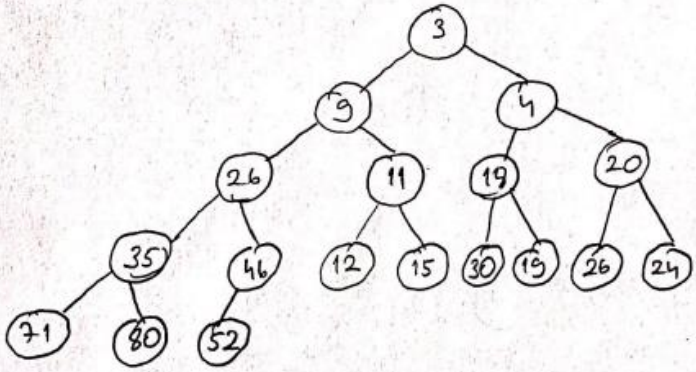
Part a)



• deleteMin operation on min heap



Part b)

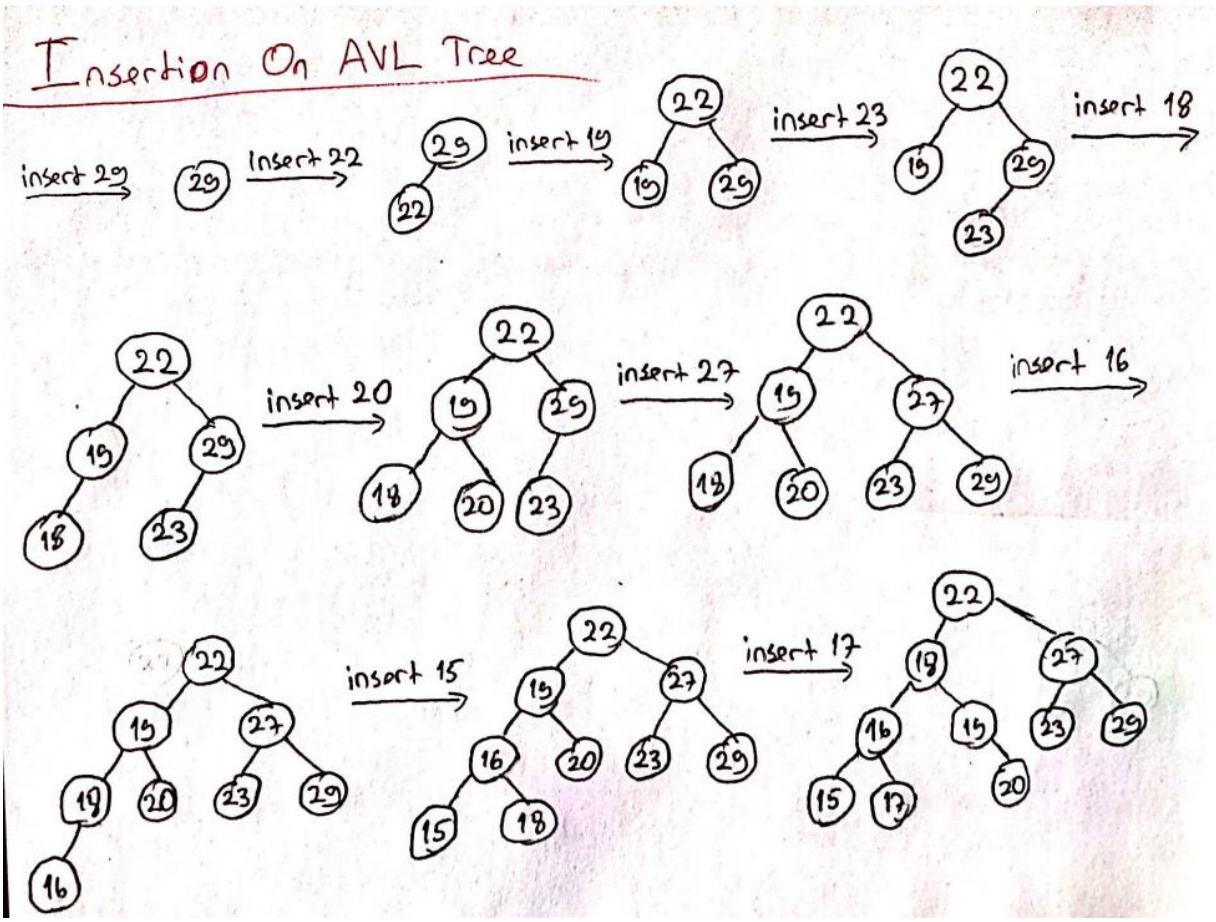


- Preorder Traversal
- 3-9-26-35-71-80-46-52-11-12-15-4-18-30-19-20-26-24
- Output is not sorted, since min-heap does not guarantee that left and right child of a parent is sorted. It only guarantees that a parent is smaller than its children.

- Inorder Traversal
- 71-35-80-26-52-46-9-12-11-15-3-30-18-19-4-26-20-24
- Output is not sorted. However, it could be sorted, if it was a BST. Therefore, until the tree is a BST inorder traversal can not give a sorted output.

- Postorder Traversal
- 71-80-35-52-46-26-12-15-11-9-30-19-18-26-24-20-4-3
- Output is not sorted. Moreover, in postorder traversal output is not sorted for any type of tree.

Part c)



QUESTION 3

- Running the simulation one by one for every printer until finding the correct one is inefficient since it requests N tries for simulation which is very time-consuming when the simulation time complexity is considered as well. Therefore, for N printers starting the simulation with N/2 printers is logical since, it enables to eliminate the other half of the printers. Dividing printer number with 2 until finding the correct printer number, enables us to find the optimum number of printers in log(n) tries with a simulation that is better than N tries. Moreover, the logic underlying here is the same as binary search which has O(logN) time complexity as well.