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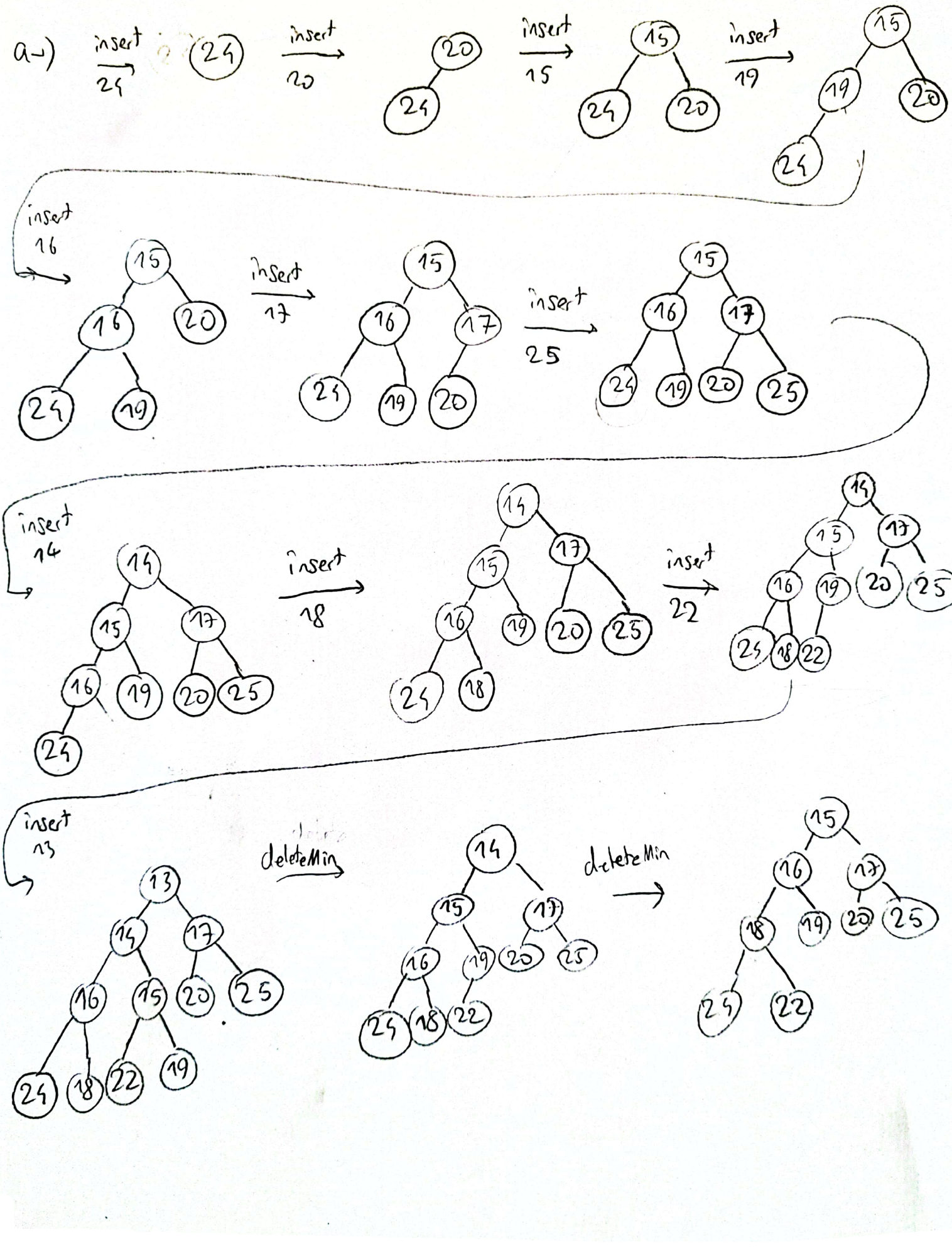
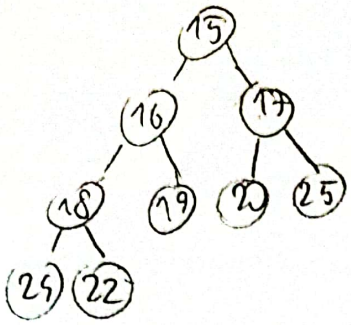
Question 1:

a-)



b-) Consider result of a-) as binary min-heap



Preorder traversal: 15, 16, 18, 24, 22, 19, 17, 20, 25

Inorder traversal: 24, 18, 22, 16, 19, 15, 20, 17, 25

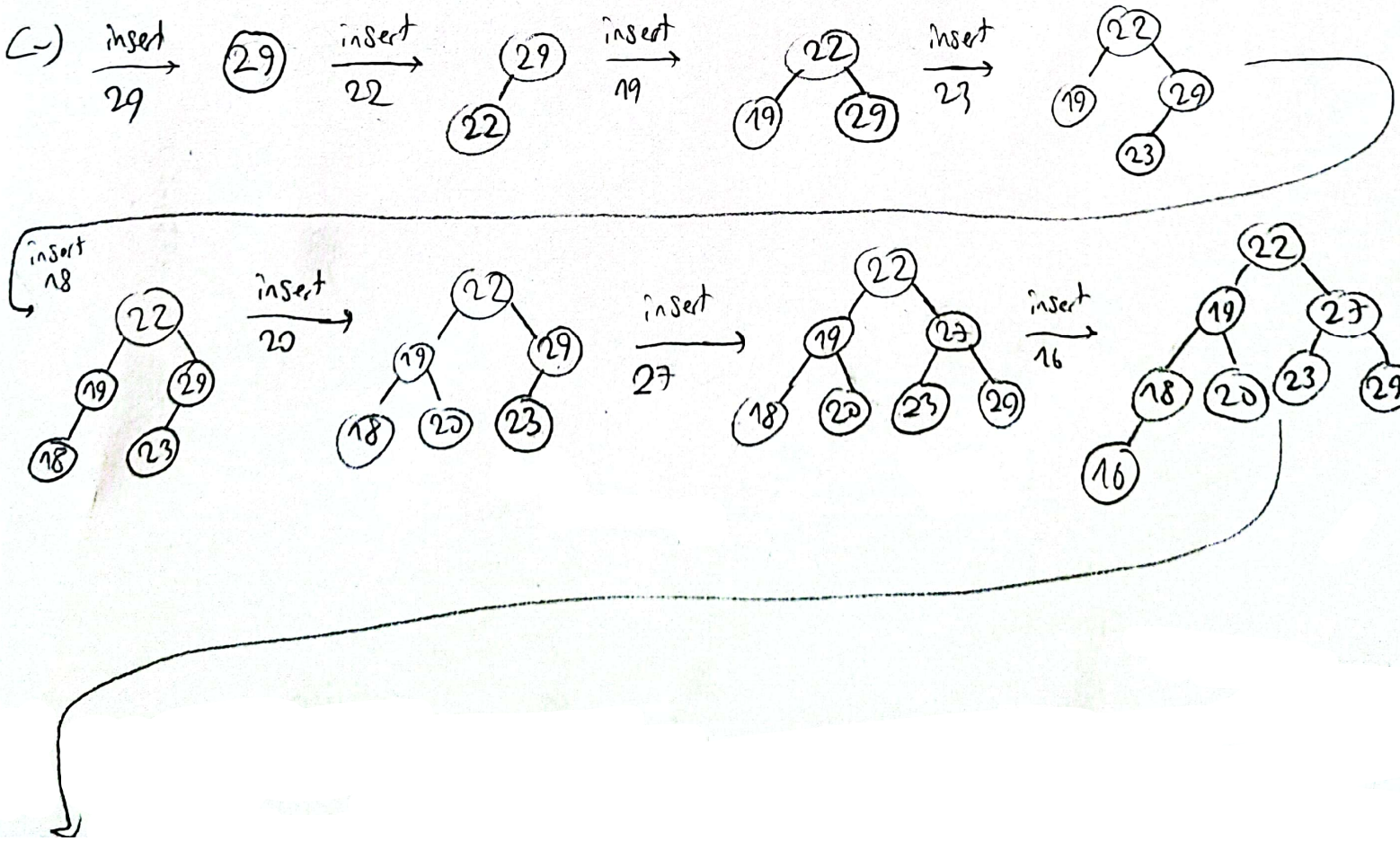
Postorder traversal: 24, 22, 18, 19, 16, 20, 25, 17, 15

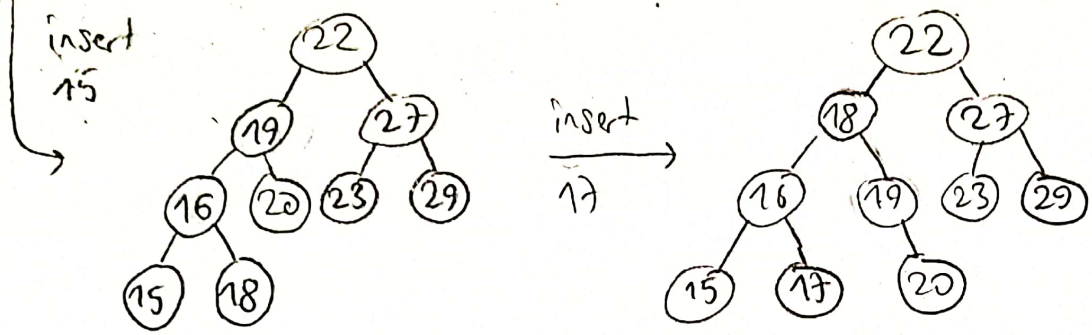
None of the traversals are sorted. Let's take inorder traversal first. It is unsorted because in inorder traversal, we visit left child, parent and right child, respectively and there isn't an order such as from left to right, data gets bigger. In heaps, parent is bigger or smaller than both childs. Therefore, we can't find a sorted output with inorder traversal.

In preorder traversal, we start with small data and go to bigger data. It seems like output can be sorted. However, there is no rule for childs of heap. One of them can be bigger or smaller than other one. Therefore, even if we go to big from small, childs prevent us to get a sorted output with preorder traversal.

Similar to preorder, we go from big data to small data in postorder traversal. However, childs prevent us to get a sorted output.

c-)





Question 3:

It is definitely wrong to repeat simulation from 1 printer for large libraries and many print requests. Because in our code, we use small amount of requests and using many and nested loops for them does not create a problem in terms of efficiency. However, many requests won't be efficient especially at 1 printer. It will be faster when amount of printers are increased but it won't be an efficient way. Instead of starting with one printer, we can start with bigger amount of printers estimated according to requests and the library before running program. Also we can increment amount of printers not 1 but 2, 3 or more. Then, when we find a time below maximum average, it just need to decrement amount of printers 1 to find actual optimum time. Decrementing may be in efficient in small numbers of requests. However, in large numbers, we will not need to simulate for many printer numbers.