

CS240, Spring 2022

Assignment 3: Question 1

Q3b)

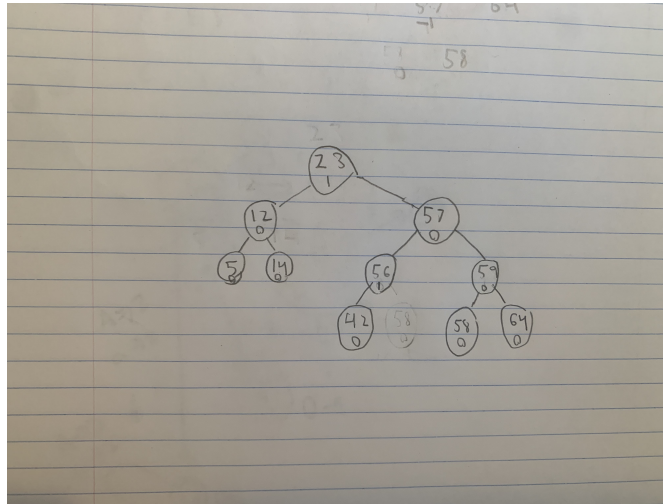


Figure 1: AVL tree after 58 is inserted

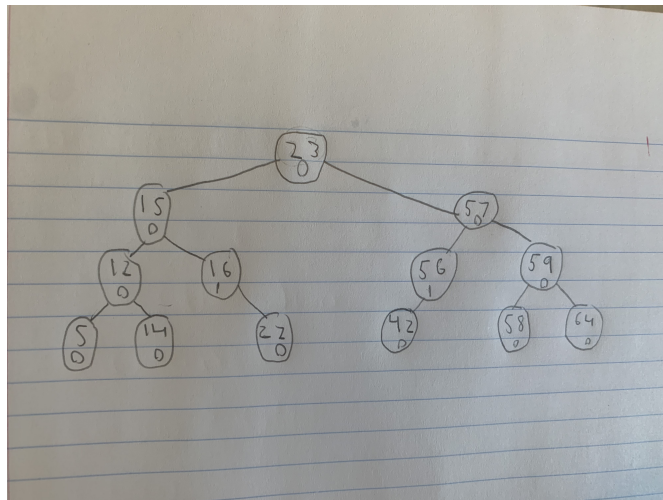


Figure 2: AVL tree after 22 is inserted

Q3c) In order to derive this we would first make an array of all the nodes in the AVL tree and we would sort this array.

[5, 12, 14, 15, 16, 22, 23, 42, 56, 57, 58, 59, 64]

From this array we would pick the middle element (using the floor) and then split the array into two around the element we would removed, this would give us:

inserted = [23]

[5, 12, 14, 15, 16, 22], [42, 56, 57, 58, 59, 64]

Repeating the process for both arrays (working left to right our next step would give us:

inserted = [23, 14, 57]

[5, 12], [15, 16, 22], [42, 56], [58, 59, 64]

Repeating this again we get:

inserted = [23, 14, 57, 5, 16, 42, 59]

12], [15], [22], [56], [58], [64]

Finally we would get that the order we should insert nodes in as:

[23, 14, 57, 5, 16, 42, 59, 12, 15, 22, 56, 58, 64]

In general we would create a recursive algorithm which given an array would print the middle element (calculated using the floor), if the array is only size 1 we would stop otherwise we would split the array into half around the middle element and run the algorithm on it

Q3d)

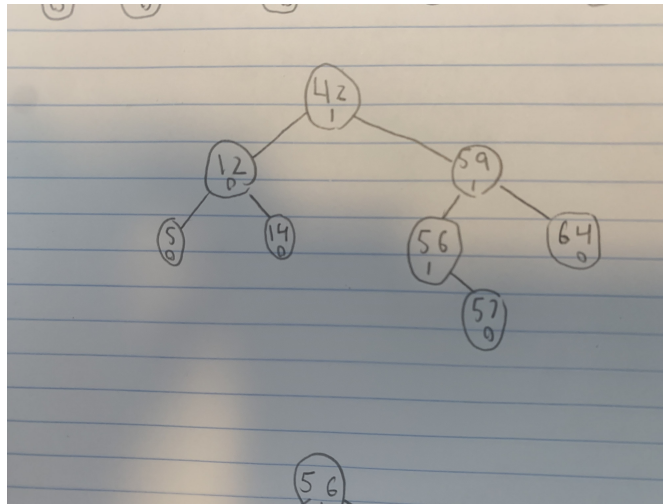


Figure 3: AVL tree after 23 is deleted

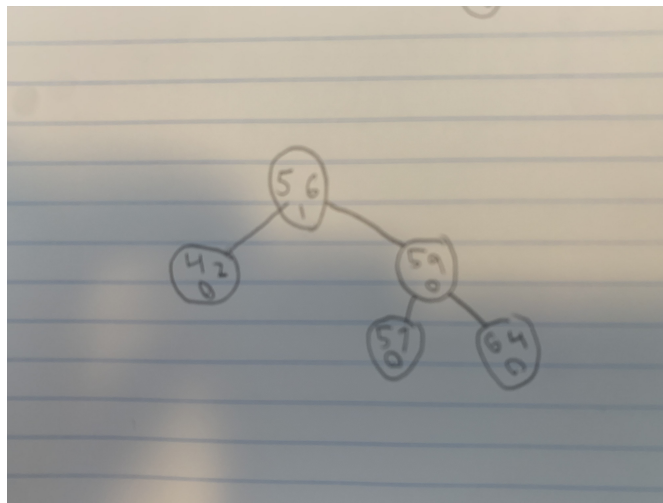


Figure 4: AVL tree after 5 is deleted