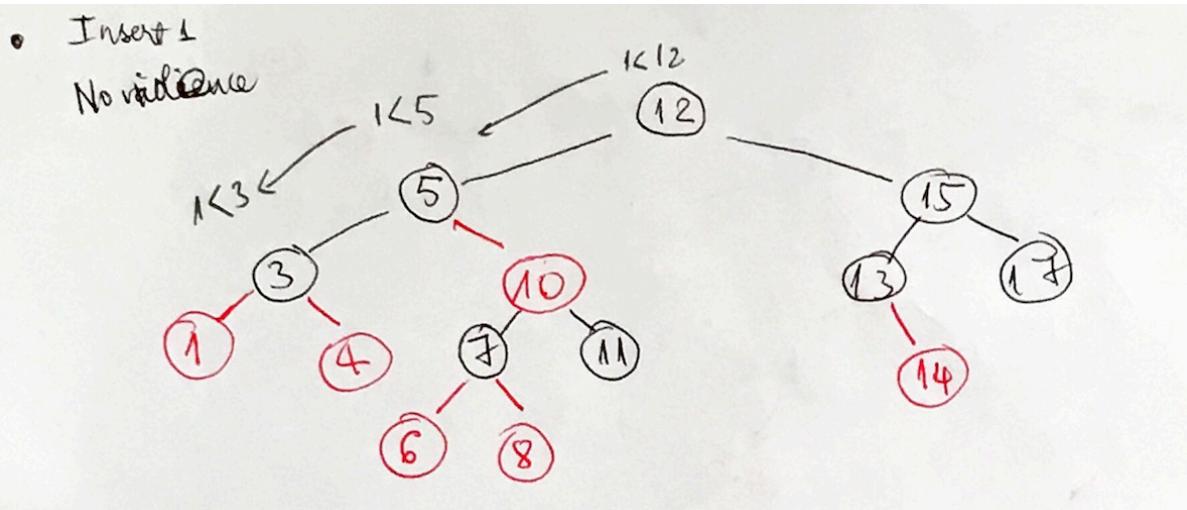


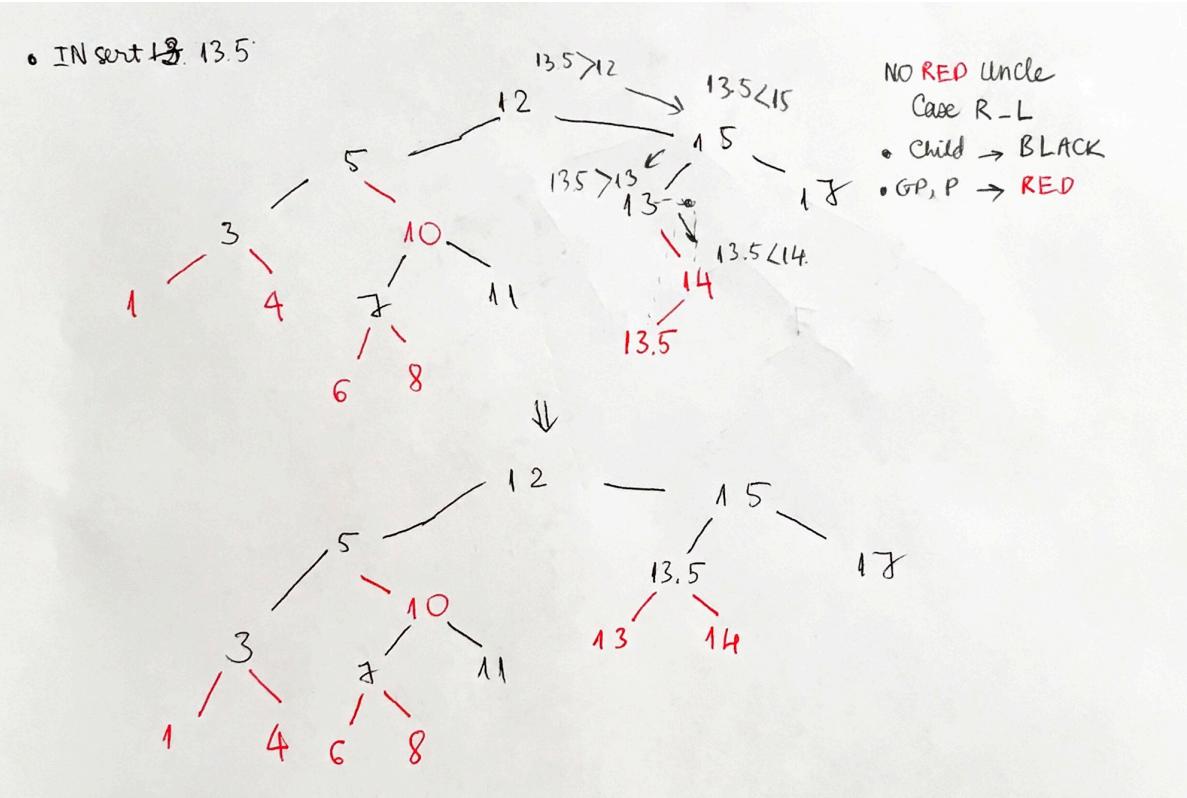
Course: Algorithm
Prof. Prem Nair
Student: Binh Van Tran
ID: 986648
Homework: Lab 10

1. Problem 1 – Insertion

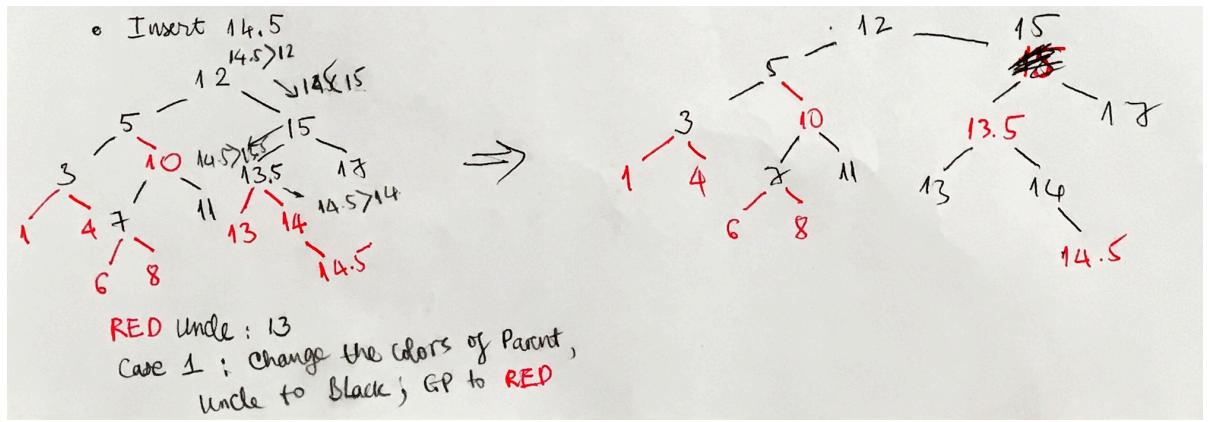
a. Insert 1



b. Insert 13.5

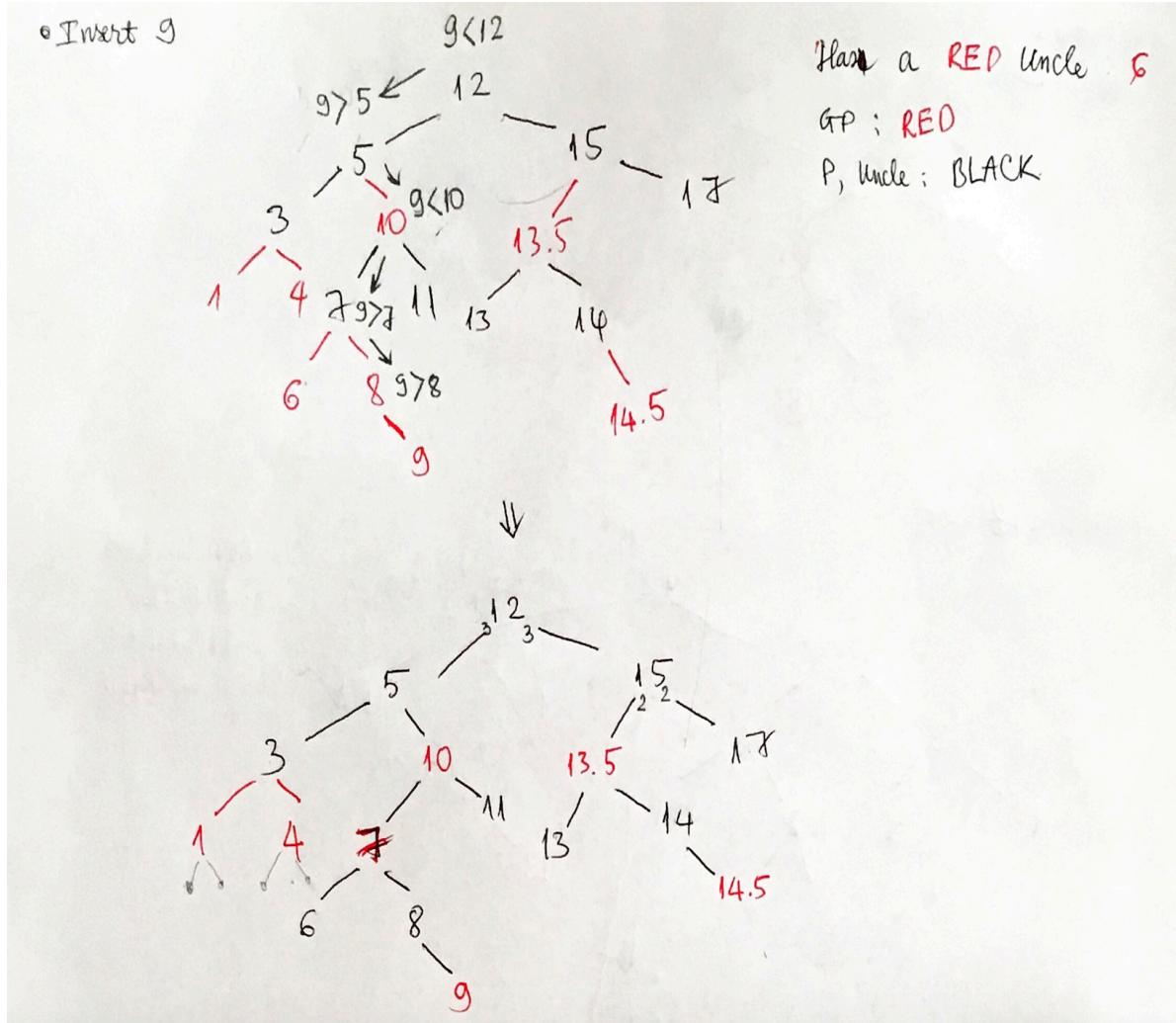


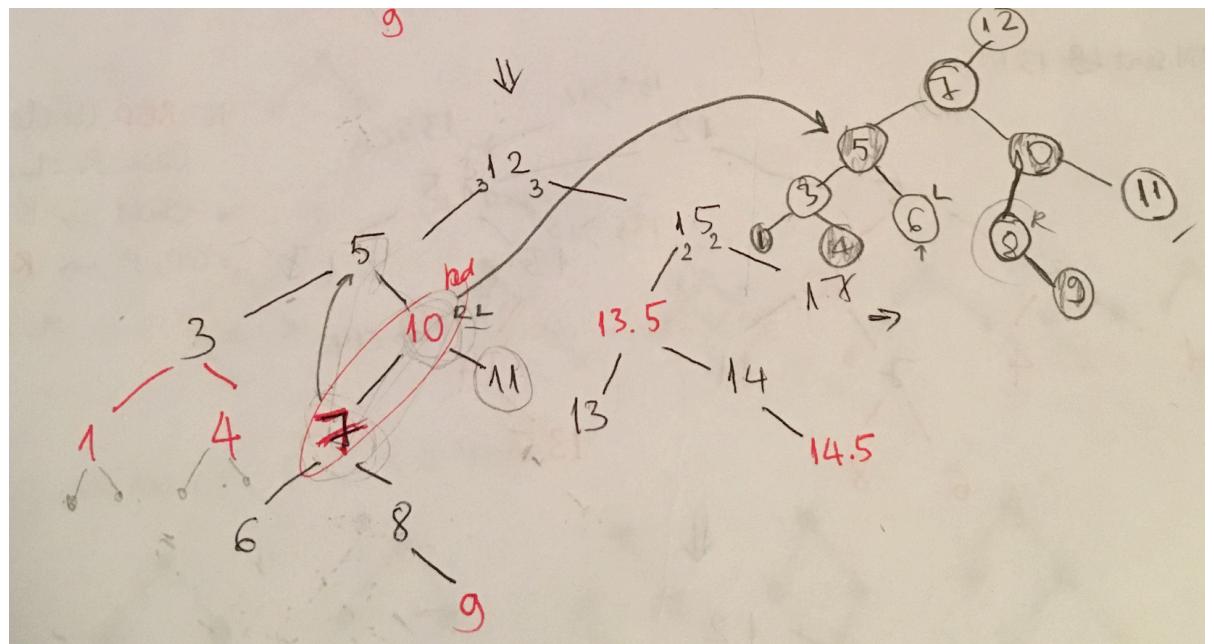
c. Insert 14.5



d. Insert 9

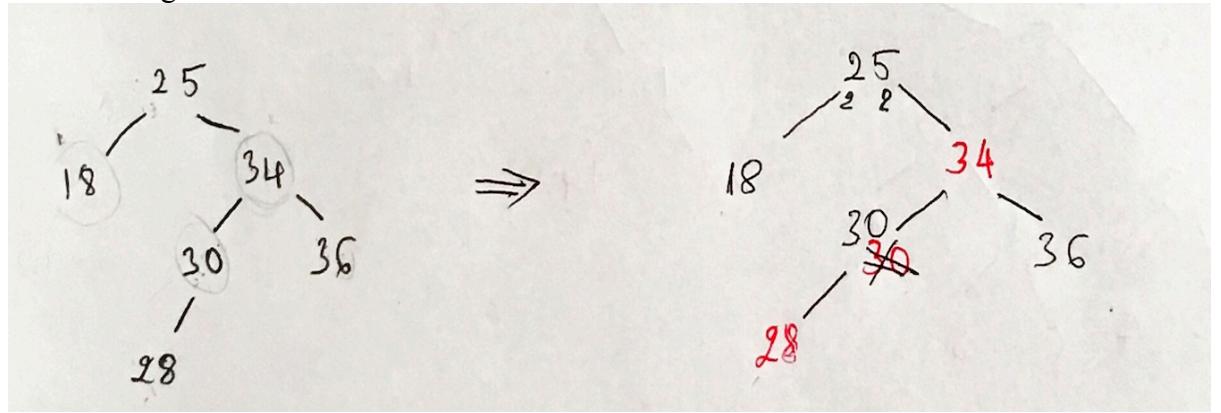
• Insert 9



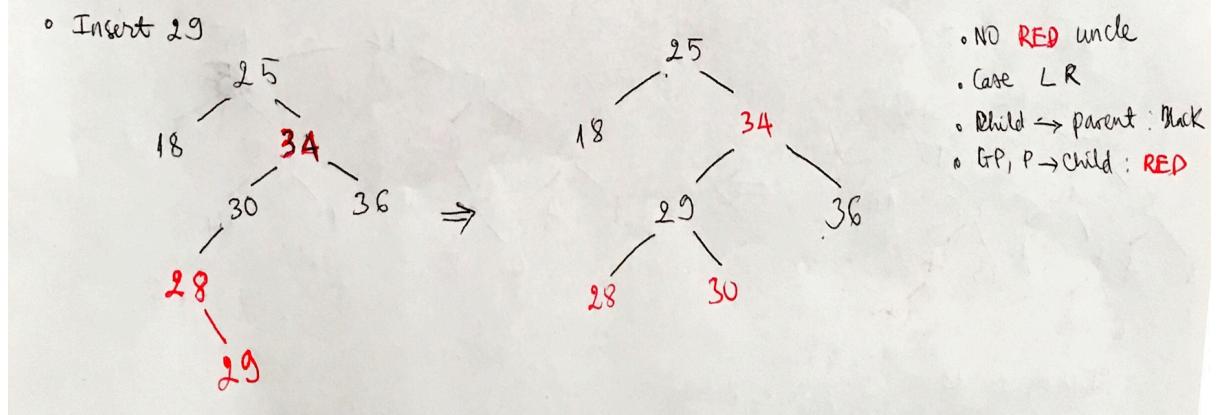


2. Problem 2 – Indicate the color and insert new node

a. Coloring the tree



b. Insert 29



3. Problem 3 – Exploration

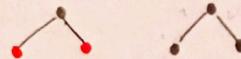
a. How many Red-Black Trees

• Number of nodes is 1 : 1 tree

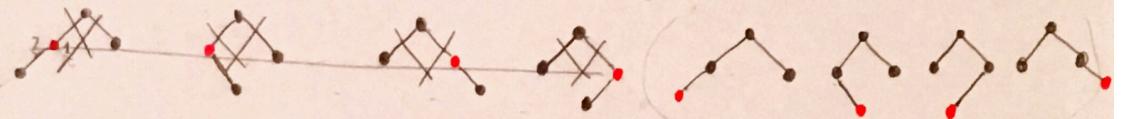
• Number of nodes is 2 : 2 trees



• Number of nodes is 3 : (2 trees)



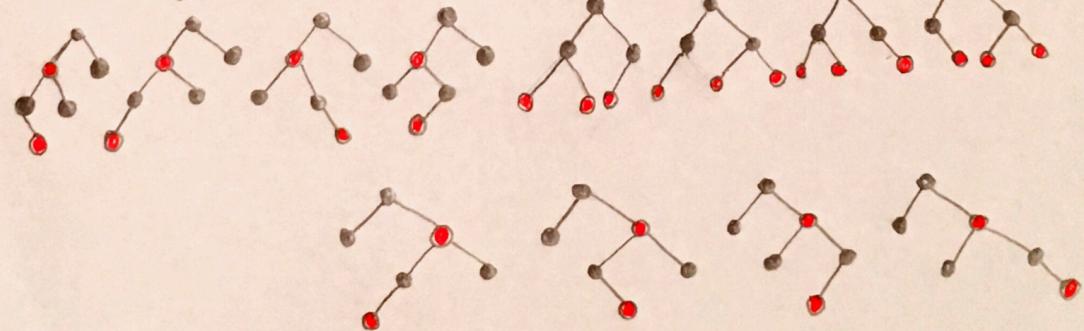
• Number of nodes is 4 : (4 trees)



• Number of nodes is 5 : (6 trees)



• Number of nodes is 6 : (12 trees)



- Maximum value of the ratio of #Red nodes/#Black nodes: 1:1 (to make sure root is always black and there are no two consecutive red nodes)
- Minimum value of the ratio of #Red nodes/#Black nodes: 0 (all are black nodes)