Technische Universität München
Fakultät für Informatik
Lehrstuhl für Effiziente Algorithmen
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Wintersemester 2015-16
Assignment 4
November 9, 2015

Efficient Algorithms and Datastructures I

Question 1 (10 Points)

Show that any arbitrary binary tree with n internal nodes can be transformed into any other arbitrary binary tree with n internal nodes using $O(n)$ rotations.

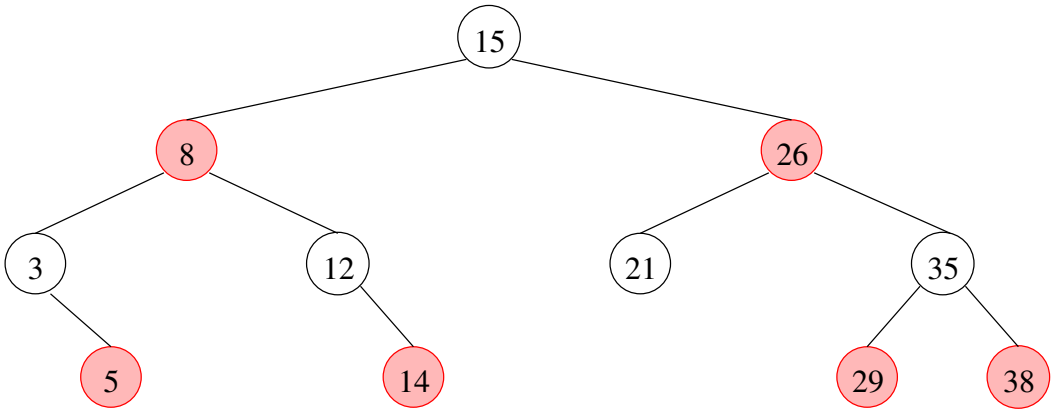
Question 2 (10 Points)

Give tight asymptotic bounds for $T(n)$:

$$T(n) = 2T\left(\frac{n}{2}\right) + \frac{n}{\log n}$$

Question 3 (10 Points)

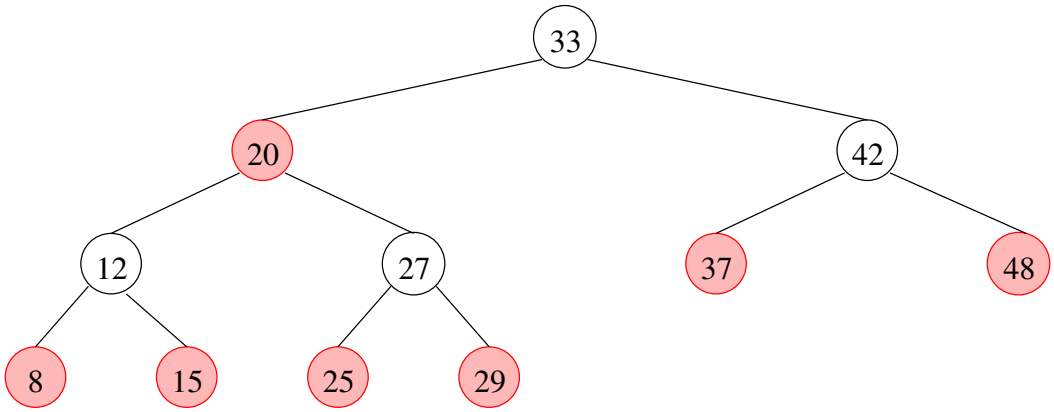
Carry out the following operations sequentially on the red-black tree shown below so that it remains a red-black tree and show what the tree looks like after each operation(always carry out each operation on the result of the previous operation):



1. Insert 10
2. Delete 29
3. Delete 21
4. Delete 3

Question 4 (10 Points)

Carry out the following operations sequentially on the red-black tree shown below so that it remains a red-black tree and show what the tree looks like after each operation(always carry out each operation on the result of the previous operation):



1. Insert 5
2. Delete 27
3. Insert 27