CS 3343 Analysis of Algorithms – Fall 07

10/16/07

6. Homework

Problem 1 is due **10/23/07** before class
Problem 2 is due **10/30/07** before class.

1. **(30 points) Red-black trees**
   Find a sequence of numbers which, when incrementally inserted into a red-black tree, causes the following sequence of rotations:

   left, left, right, right.

   You may start with an initially non-empty tree, and you may insert numbers that do not cause any rotations. But there should not be any additional rotations performed.

   Draw the sequence of trees that you obtain after each insertion. For each such tree indicate the node that violates the red-black tree condition, indicate the nodes that participate in the rotation, the type of the rotation, and the subtrees that correspond to each other before and after the rotation.
   Hint: Use a red-black tree demo from the web.

2. **(70 points) (2,3)-tree implementation**
   Implement the insert operation on (2,3)-trees. Your program should be able to take a list of integers and incrementally insert these integers into a (2,3) tree. Please email your zipped code to akarmake@cs.utsa.edu .

   Extra credit: Up to 50 points of extra credit can be earned for additionally implementing the delete operation on (2,3)-trees.