Problem Set No. 1

COS 521 Due: Thursday Oct. 3
Fall 2002
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1. A *red-black tree* is a binary tree with each node colored red or black such that: (a) every path from the root to a missing node contains the same number of black nodes; (b) every red node has a black parent. Describe a linear-time algorithm that, given a binary tree, either colors the nodes red and black so that (a) and (b) hold, or declares this impossible. If you can't get a linear time algorithm, get one as fast as possible. Prove your algorithm correct.

2. Describe, in as general a way as possible, a set of generalized splaying rules, each of which guarantees O(mlogn) access time for a sequence of m accesses on an n-node tree, $m \geq n$. At a minimum, give some examples of rules that work, and some that don't.