

CMPS 101

Final Review Problems

1. State the following properties:
 - a. The Binary Search Tree Properties:
 - b. The Red-Black Tree Properties:
2. Let x be a node in a red-black tree. Show that the longest path from x to a descendent leaf has length at most twice that of a shortest such path.
3. Prove that any red-black tree on n nodes and with height h satisfies $h \leq 2\lg(n+1)$. (Use the following fact: If x is any node in a red-black tree, then the number of internal (i.e. non-nil) nodes in the subtree rooted at x is at least $2^{\text{bh}(x)} - 1$.)
4. Draw the Red-Black tree which results from inserting the keys 5, 4, 1, 3, 2 (in order) into an initially empty tree. Draw all intermediate trees in this process.