CMCS 341

Homework #4

Assigned Wed. Oct 24
Due (hard copy in class) Wed Oct 31 / Thur Nov 01

1. (5 points) Show the result of successively inserting the values **2, 1, 4, 5, 9, 3, 6, 7** into an empty splay tree. Show the tree at the end of each insertion.

2. (2 points) Is it true that the worst case height for splay tree of n nodes is in O(log n).

3. (5 points) Prove that any red-black tree with root x, has $n \geq 2^{bh(x)} - 1$ nodes, where bh(x) is the black height of node x. [Note: inductive proof is not required.]

4. (5 points) Show the result of successively inserting the values **20, 15, 10, 5, 2, 1** into an empty read-black tree. Show the tree at the end of each insertion.

5. (5 points) Show the result of heapifying the following initial array

   10, 12, 1, 14, 6, 5, 8, 15, 3, 9, 7, 2

   into a min binary heap. Show the tree at the end of each percolateDown operation.

6. (3 points) Insert the following pairs (in the order shown) into an initially empty 2-D tree.

   (53, 14), (27, 28), (30, 11), (67, 51), (70, 3)

   .