

CS 213

Homework Assignment 8

Given: March 12, 2009

Due: March 26, 2009

This assignment is due by the end of the class on the due date. Unless all problems carry equal weight, the point value of each problem is shown in []. To receive full credit all your answers should be carefully justified. Each solution must be the student's own work. Assistance should be sought or accepted only from the course staff. Any violation of this rule will be dealt with harshly.

1. Draw an example of an AVL tree such that a single `removeElement` operation could require $\Theta(\log n)$ restructurings (or rotations) from a leaf to the root in order to restore the height-balance property. (Use triangles to represent subtrees that are not affected by this operation).
2. Extend the AVL tree data structure to implement the following method for an ordered dictionary D in $O(\log n)$ time.

`countInRange(l,u)`: compute and return the number of items in D with key k such that $l \leq k \leq u$.

Note that this method returns a single integer.

3. Consider hashing with chaining in which new elements are inserted at the end of the list. In this case derive the expected search time.