CS3323 Fall 2006 Assignment 3

Due Monday, Oct. 30, by 5pm.

Assignments should be handed in by placing them in the CS3323 bin on E level of Gillin Hall.

1. Given a new element e_1 and an element e_2 stored in a singly linked list, design an algorithm to insert e_1 before e_2 (if e_2 is not in the list, insert e_1 at the tail). Give the pseudo code of your algorithm and analyze its time complexity.

2. What is the output from the following sequence of priority queue ADT methods: insert(5,A), insert(4,B), insert(7,I),insert(1,D), removeMin(), insert(3,J), insert(6,L), removeMin(), removeMin(), insert(8,G), removeMin(), insert(2,H), removeMin(), removeMin().

3. (a) Illustrate the execution of the selection-sort algorithm implemented by a Priority Queue on the following input sequence: $(22, 15, 36, 44, 10, 3, 9, 13, 29, 25)$.
   (b) Illustrate the execution of the insertion-sort algorithm implemented by a Priority Queue on the input sequence given in part (a).

4. Draw a single binary tree T such that

   - each internal node of T stores a single character
   - a *preorder* traversal of T yields EXAMFUN; and
   - a *inorder* traversal of T yields MAFXUEN

5. Give an $O(n)$-time algorithm for computing the depth of each node of a tree T, where n is the number of nodes of T. Assume the existence of methods setDepth(v,d) and getDepth(v) that run in $O(1)$ time.