

CSE 150: Problem Set #5

November 25, 2008

Problem 1

Write a partition algorithm for linked lists that takes a list L and a value x and returns three linked lists L_1, L_2, L_3 such that all the elements of L_1 are $< x$ and all the elements of L_2 are $= x$, and all the elements of L_3 are $\geq x$.

Use this algorithm to write a $O(n \log n)$ quicksort algorithm for linked lists and a linear-time $\text{kth}(L, k)$ algorithm that returns the k th-smallest element of L .

Problem 2

- Write an algorithm to remove the smallest element from a binary search tree. You should fix up the tree so that it is still a binary search tree and no elements get lost.
- Write an algorithm to remove the root of a binary search tree. Hint: you need to replace the root with a new root – use your algorithm from above to get the new root.

Problem 3

Modify the reachable-set algorithm from class to determine whether an undirected graph contains a cycle.