

University of Houston

COSC 3320: Algorithms and Data Structures
Spring 2016

Homework 6

Due April 14, at the start of class

1. Insert, in this order, the following entries in an initially empty binary search tree: $(9, x)$, $(4, a)$, $(17, f)$, $(1, c)$, $(8, a)$, $(14, k)$, $(20, d)$, $(2, p)$, $(13, w)$. You are to draw the final binary search tree.
2. Let T be a binary search tree which implements a dictionary. Let v be a node of T , and T_v be the subtree rooted at v . Design a recursive algorithm `CountLE`(v, k) which, given an input node v and a key k , returns the number of entries in T_v with key at most k .
3. Design and analyze a simple and efficient non-recursive algorithm to determine the height of a $(2, 4)$ -tree.
4. Let T be a $(2, 4)$ -tree containing n entries with distinct, integer keys. Suppose every node $v \in T$ maintains a variable $v.size$ that stores the number of entries contained in the subtree rooted at v (denoted T_v), included the entries in v . Design a recursive algorithm `Count` which, given an integer k , returns in $O(\log n)$ time the number of entries in T with key less than k .