CSci 231 Homework 6

Binary Search Trees and Hashing

CLRS Chapter 11.1-11.3 and 12.1-12.3

Write and justify your answers on this sheet in the space provided.[1]

1. (CLRS 12.2-5) Show that if a node in a binary search tree has two children, then its successor has no left child and its predecessor has no right child.

2. (CLRS 11.2-2) Demonstrate the insertion of the keys $5, 28, 19, 15, 20, 33, 12, 17, 10$ into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be $h(k) = k \bmod 9$.

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[1]Collaboration is allowed and encouraged, if it is constructive and helps you study better. Remember, exams will be individual.Write up the solutions on your own.

3. (CLRS 11.1-4) We wish to implement a dictionary by using direct addressing on a *huge* array. At the start, the array entries may contain garbage, and initializing the entire array is impractical because of its size. Describe a scheme for implementing a direct-address dictionary on a huge array. Each stored object should use $O(1)$ space; the operations SEARCH, INSERT and DELETE should take $O(1)$ time each; and the initialization of the data structure should take $O(1)$ time.

   (Hint: Use an additional stack, whose size is the number of keys actually stored in the dictionary, to help determine whether a given entry in the huge array is valid or not.)