CSE 250 Spring 2011
Homework 5
Due Date: April 25, Monday, by 2:05pm
Total Points: 39

1. (5 points) Insert the key values 7, 6, 9, 10, 14, 8, 11, 12 (in this order) into an initially empty AVL tree. Show the resulting tree after each insert operation.

2. (6 points) Consider a B-tree with CAP = 5. (Namely, each node has at most 5 children, and each node contains between 2 and 4 key values). Insert the following sequence of key values:

   10 20 0 1 5 8 34 16 18 13 15 33 45 26 34 29

   into an initially empty B-tree. Show the resulting B-tree each time a new node is created.

3. (4 points) Remove keys 30, 26, 15 and 17 from the B-tree shown in Fig 11.58. Show the resulting B-tree after each remove operation.

   For the problems 4, 5, 6, draw the binary heap of the results, (not the array).

4. (6 points) Insert the sequence of keys:

   13, 15, 4, 17, 9, 8, 11, 18, 6, 12

   into an initially empty (max) heap. Show the result after each insert operation.

5. (4 points) Perform the `delete_max()` operation twice to the heap in the previous problem. Show the result after each operation.

6. (4+4 = 8 points) Perform HeapSort on the following input array:

   45, 40, 1, 30, 70, 80, 50, 90, 60, 10

   (a) Show, step-by-step, the result of `built_heap` function of the above array.

   (b) Show, step-by-step, the result of `shrink_heap` function of the array.

7. (2+2+2=6 points). Given the input:

   371, 323, 173, 199, 344, 679, 989

   and the hash function: `h(x) = x (mod 10)`, show the resulting hash table by using:

   (a) Separate chaining hash table

   (b) Open addressing hash table using linear probing

   (c) Open addressing hash table using quadratic probing