Homework 4 (Cpt S 223)

Due Date: October 31, 2012

Total points: 48

For all questions involving heaps in this problem set, assume a MinHeap by default, unless otherwise specified.

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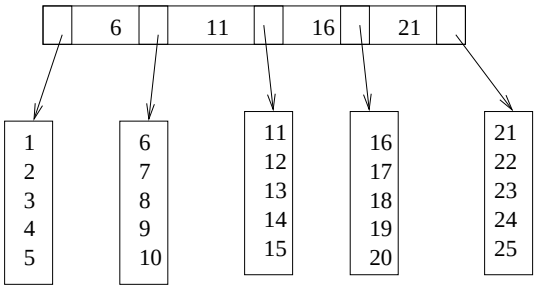
1. (5 points) Insert 26 into the following B+ tree:

   M=5, L=5

2. (5 points)

   Calculate the parameters M and L for a B+tree that meets the following specifications: Each data record in the array is 32 bytes. The search key occupies 12 bytes. Each disk block is 4 KB (=4,096 bytes). Assume 64-bit CPU architecture (i.e., pointers cost 8 bytes each).

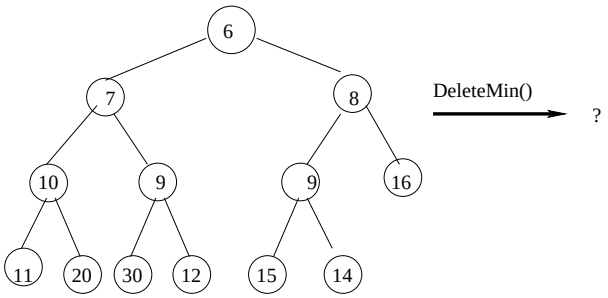
3. (5 points) Draw the binary heap in its tree form from its array form:

0	1	2	3	4	5	6	7	8	9	10	11	12
	2	3	4	9	10	17	15	11	9	13	22	20

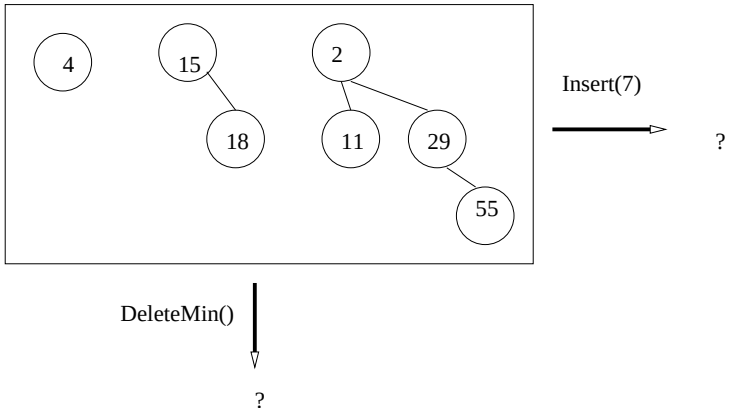
4. (7 points) Starting with an empty binary heap, insert the following sequence of elements into it: 10, 5, 2, 3, 7, 8, 1. Your answer should show the resulting binary heap after each insertion. However, there is no need to show the the intermediate trees *within* an insertion step.

5. (7 points) Build a heap for the following set of elements using the BuildHeap() method: {10,5,2,3,7,8,4,9,1}. You can populate the initial heap for the BuildHeap() function in any order of elements you want. But make sure you show the heap at different steps of the BuildHeap function, starting from your initial heap to your final binary heap.

6. (5 points) Show the resulting binary heap after performing DeleteMin:

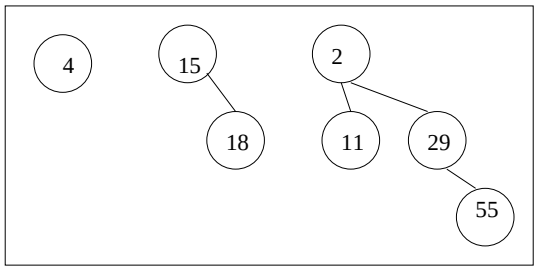


7. (8 points) Perform the following two operations on the binomial heap, each independently starting with the following input binary heap:



8. (6 points) Merge the following two binomial heaps, H_1 and H_2:

H_1:



H_2: