

ALGORITHM

Due Date: 9:20 AM, November 15

Autumn, 2012

The following problem sets are all from CLRS.

Homework 6

1. Show that there are at most $\lceil n/2^{h+1} \rceil$ nodes of height h in any n -element heap.
2. Using the figure in page 40 of Lecture Note 6 as a model, illustrate the operation of `MAX-HEAP-INSERT`($A, 10$) on the heap $A = \langle 15, 13, 9, 5, 12, 8, 7, 4, 0, 6, 2, 1 \rangle$.
3. Write pseudocode for the procedures `HEAP-MINIMUM`, `HEAP-EXTRACT-MIN`, `HEAP-DECREASE-KEY`, and `MIN-HEAP-INSERT` that implement a min-priority queue with a min-heap.
4. What is the running time of heapsort on an array A of length n that is already sorted in increasing order? What about decreasing order?
5. The operation `HEAP-DELETE`(A, i) deletes the item in node i from heap A . Give an implementation of `HEAP-DELETE` that runs in $O(\lg n)$ time for an n -element max-heap.
6. Using the figure in page 7 of Lecture Note 7 as a model, illustrate the operation of `PARTITION` on the array $A = \langle 12, 19, 8, 4, 11, 9, 6, 3, 20 \rangle$.