Chapter 7 Homework

Deadline: 2021/10/15

10:10 a.m

1. Show that there are at most $\lceil n/2^{h+1} \rceil$ nodes of height h in any n-element heap.

2. You are given a sequence of integers to be sorted with QUICKSORT, where PARTITION always picks the rightmost element as pivot. Construct one example such that the algorithm runs in $\Theta(n^2)$, and prove a tight upper bound $O(n^2)$.

3. Use the substitution method to prove that the best-case time complexity of QUICKSORT is $\Omega(n \lg n)$.

4. For a randomized algorithm such as RANDOMIZED-QUICKSORT, why is the expected running time, as opposed to the worst-case running time, being analyzed?