CS 240E: Structures and Data Management **Winter 2021**

Tutorial 2: Jan 22

1. Consider the following recursion: $T(0) = 0$,

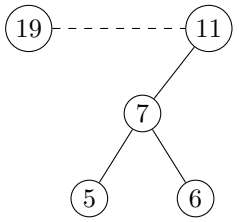
$$T(n) = n + 1 + \min_{0 \le i \le n-1} \{T(i) + T(n - i - 1)\} \qquad \text{for } n \ge 1.$$

Show that $T(n) \ge (n + 1) \log(n + 1)$. Hint: convince yourself that $f(x) = x \log x$ is convex.

2. Let $0 < \epsilon < 1$. Suppose that we have an array A of n items such that the first $n - n^\epsilon$ items are sorted. Describe an $O(n)$ time algorithm to sort A.

3. Perform the following operations on the binomial heap below, in order:

- Insert a node with key 4.
- Perform merge with the following binomial heap:



- Call deleteMax.