Exercises

Algorithm theory
Winter term 2008/09
Exercise sheet 14

TASK 1 (1 point):
Insert 2, 7, 27, 5, 56, 1, 34, 16 in an empty binominal queue. After this perform one deletemin operation. Illustrate the resulting binominal queue for each step.

TASK 2 (1 point):

1. Execute the following operations on an initially empty Fibonacci Heap:

   \[
   \text{insert}(15), \text{insert}(27), \text{insert}(6), \text{insert}(34), \text{insert}(42), \text{insert}(35), \text{insert}(3), \text{insert}(41), \text{insert}(22), \text{insert}(12), \text{deletemin}(), \text{decreasekey}(27, 2), \text{decreasekey}(34, 17), \text{deletemin}()
   \]

   For all intermediate stages illustrate the structure of the Fibonacci Heap. A new element is inserted to the right of the current minimum. The consolidation during the operation deletemin starts with the element to the right of the deleted minimum.

2. Show that the following claim is not true:

   The maximum height of a tree within a Fibonacci Heap with \( n \) nodes is \( O(\log n) \).

   Proceed as follows: For an arbitrary \( n > 0 \) give a sequence of operations that creates a Fibonacci Heap that finally consists of one tree that is a linear chain of \( n \) nodes.