

FIT3155: Week 6 tutorial

Covering concepts from Weeks 5

Objectives: The tutorials, in general, give practice in problem solving, in analysis of algorithms and data-structures, and in logic useful in the above.

Instructions to the class: Prepare your answers to the questions **before** the tutorial. It will probably not be possible to cover all questions unless the class has prepared them all in advance.

Instructions to Tutors:

- i. The purpose of the tutorials is not to solve the practical exercises.
- ii. The purpose is to check answers, and to discuss particular sticking points, not to simply make answers available.

1. Using mathematical induction, for a binomial tree B_k of order k , prove that:

- (a) B_k contains 2^k nodes.
- (b) B_k has a height k .
- (c) B_k has exactly k -choose- d nodes at each depth $0 \leq d \leq k$.

2. Insert the following elements in a binomial heap:

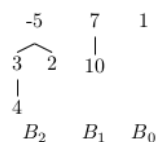
8, 2, 6, 8, 10, 11, 12

3. Insert the following elements in a binomial heap:

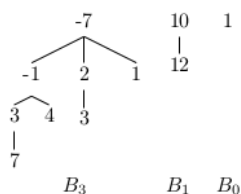
2, 8, 10, 11, 5, 11, 103, 4

4. Perform **merge** on the following two binomial heaps:

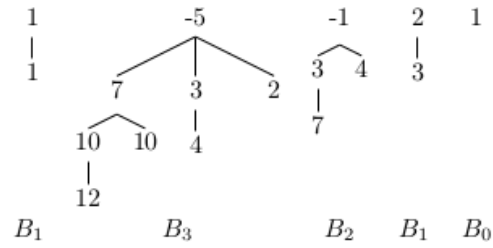
Binomial heap H_1



Binomial heap H_2



5. Perform **merge** followed by **extract-min** on the following (improper state of) binomial heap:



6. Show that the amortized complexity to **insert** n elements into a binomial heap is $O(n)$.

--o0o--
 END
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