DM19 – Algorithms and Complexity – E04 – Lecture 3

Lecture, September 13

Lower bounds from section 2.4 of the of the notes (by Baase) were discussed (part of this is also in section 8.1 of the textbook). Then we covered adversary arguments from sections 3.1 and 3.2 of the same notes.

Lecture, September 20

We will cover sections 3.3 and 3.5 of the first set of notes, plus median finding from chapter 9 (sections 9.2 and 9.3) in the textbook.

Lecture, September 27

We will cover amortized analysis from chapter 17 and Fibonacci heaps from chapter 20 in the textbook.

Problems to be discussed in week 39

- From Baase's textbook: How many comparisons are done by the tournament method to find the second largest item on average if n is a power of 2?

- From Baase's textbook: Suppose $L1$ and $L2$ are arrays, each with n keys sorted in ascending order.

  - Devise an $O((\lg n)^2)$ algorithm to find the nth smallest of the $2n$ keys. (For simplicity, you may assume the keys are distinct.)
  - Give a lower bound for this problem.

- Design an algorithm for finding the second largest item in array, which is similar to the standard algorithm for finding the largest. Keep track of the largest and second largest at each step. How many comparisons does your algorithm do in the worst case?

- Design an efficient algorithm to find the third largest item in an array.

- Do the following problems from the textbook: 9.3-3, 9.3-7, and 9.3-9.

Announcement

I lighed med tidligere år afholdes der obligatoriske, studieorienterende samtaler for alle vore studerende på studieretningerne matematik, mat.øk., datalogi og anvendt matematik, som læser på andet studieår og opefter. Samtalerne foretages af lærerrepræsentanter fra IMADA i ugerne 39 og 40. Der er tilmeldingslister på sekretariatet.