DM19 – Algorithms and Complexity – E03 – Lecture 1

Textbook and notes

Introduction to Algorithms, 2nd edition, by T. Cormen, C. Leirserson, R. Rivest, and C. Stein, MIT Press, 2001.

Extra notes (available in the bookstore):

- *Noter til DM19 - I, Efterårssemestret 2003.* From the following sources:

  - *Computer Algorithms: Introduction to Design and Analysis*, second edition, by S. Baase, Addison-Wesley, 1987.

  - *Randomized Algorithms*, by Motwani and Raghavan, Cambridge University Press, 2000.

  - *Combinatorial Optimization: Algorithms and Complexity*, by C.H. Papadimitriou and K. Steiglitz, Prentice-Hall, 1982.

  - *Complexity and Approximation*, by G. Ausillo, P. Crescenzi, G. Gambosi, V. Kann, A. Marchetti-Spaccamela, M. Protasi, Springer-Verlag, 1999.

- *Noter til DM19 - II, Efter årssemestret 2003.* From notes by Jens Clausen, "Branch and Bound Algorithms – Principles and Examples", 1999.

Format

Lectures will be on Mondays, 14:15–16, in U44. Please read the appropriate sections in the textbook or notes before coming to class and bring your textbook with you. There will be weekly assignments (which are not obligatory) which you should be prepared to discuss in the discussion section (øvelserne) ten days after the problems are assigned. The first weekly assignment will

cover material which will be used later in the course, but not covered by lectures. The instructor is Paul Medvedev, and the discussion sections will be held in U2 at 10:15 on Thursdays. Both the lectures and discussion section sections will be in English. The problems to be discussed in the first discussion section are on this weekly note, as are those for the second discussion section.

The weekly notes and other information about the course are available through the WorldWideWeb. Use the URL:

$$\text{http://www.imada.sdu.dk/Classes/DM19/}$$

There will be an oral exam, January 30 and 31, 2004. The exam questions from last year are available in Danish, and are available on DM19's homepage. There are other earlier exam questions there also, but these are the most relevant. Some changes will be made for this year. You may do your exam in Danish if you wish.

I have office hours on Tuesdays and Wednesdays from 10:45 to 11:30.

Lecture, September 1

We will begin with an introduction to the course. Quicksort and Randomized Quicksort, from sections 7.1 to 7.3 in the textbook, will be presented. We may also begin on probability from Appendix C, sections C.2, C.3, and C.4, depending on how many in the class already know it. Otherwise, we will continue with section 7.4, analyzing Randomized Quicksort. Randomized Quicksort is also presented in the first set of notes, those by Motwani and Raghavan.

Lecture, September 8

We will finish with sections C.2, C.3, and C.4 on probability and analyze Randomized Quicksort from section 7.4 (unless we skipped probability last week). Radix sort and counting sort will be presented. Then lower bounds from section 2.4 of the first set of notes will be discussed.

Problems to be discussed in week 36

Read Appendix C in the textbook. Much of this may be review.
Do problems: C.1-2, C.1-7, C.1-8.
What is the coefficient of $x^8 y^9$ in the expansion of $(3x + 2y)^{17}$?
C.2-3, C.2-5, C.2-9.
C.3-1, C.3-2, C.3-6, C.3-8
C.4-2, C.4-5
C-1a and C-1d.

Problems to be discussed in week 37

Do problems: 7.1-2. 7.1-4, 7.2-1, 7.2-2, 7.2-4, 7.2-5, 7.3-1,7-3-2.
If we got this far in the first lecture, do problems: 7.4-2, 7.4-3, 7.4-6.