DM19 – Algorithms and Complexity – E05 – Lecture 1

Textbook and notes

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

Extra notes (available in the bookstore): *Noter til DM19, Efterårssemestret 2005*. (These are identical to those from 2004.) 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.

- "Branch and Bound Algorithms — Principles and Examples", by Jens Clausen.

- "Competitive Online Algorithms", BRICS Lecture Series LS-96-2, 1996.

Format

Lectures will be on Wednesdays, 12:15–14, in U26A, in English. 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 sections (øvelserne), usually in the week after the relevant lecture. The "instruktor" for the first half of the semester is Niels Kjeldsen, and the "instruktor" for the second half is Fiona Nielsen. We expect that one of the discussion sections will be in Danish and one in English, since there are some foreign exchange students in the class. The Thursday section is 12:15–14 and the Friday is 8:15–10, and both will be in U49C. There are two sets of problems below, the first for week 36 (September 8 and 9) and the second set for week 37.

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

http://www.imada.sdu.dk/Courses/DM19/

There will be an oral exam in January, 2006. The exam questions from last year are available available on DM19's homepage. There are other earlier exam questions there also, but these are the most relevant. Some changes may be made for this year. You may do your exam in Danish if you wish.

I have office hours on Tuesdays and Wednesdays from 9:00 to 9:45.

Lecture, September 7

We will begin with an introduction to the course. Probability from Appendix C, sections C.2, C.3, and C.4 will be covered. The slides used to present this are available on the course's Web page. Randomized Quicksort, from sections 7.3 to 7.4 in the textbook, will be presented. Randomized Quicksort is also presented in the course notes, those by Motwani and Raghavan.

Lecture, September 13

Radix sort and counting sort from sections 8.2 and 8.3 in the textbook will be presented. Then lower bounds from section 2.4 of the first part of the notes will be discussed (part of this is also in section 8.1 of the textbook). If there is time, we will also begin on sections 3.1 and 3.2 of those notes.

Problems to be discussed in week 36

Read Appendix C in the textbook.
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:
(As review of Quicksort) 7.1-2. 7.1-4, 7.2-1, 7.2-2, 7.2-4, 7.2-5.
7.3-1, 7-3-2, 7.4-2, 7.4-3, 7.4-6.