Exam questions for the exam in DM553/DM508

The exam questions are:

1. Finite automata and regular languages

2. Pushdown automata and context-free languages

3. Turing machines

4. Decidability

5. Reducibility (including mapping reductions and polynomial reductions)

6. NP-completeness proofs – examples.

7. Proof that SATISFIABILITY is NP-complete (do not assume that there is a known NP-Complete problem — use the proof in Sipser's book).

8. Information-theoretic lower bounds (lower bounds proven by counting leaves in decision trees) and adversary lower bounds for sorting by comparisons (including lower bounds for average behavior).

9. Adversary arguments – techniques, examples.

10. Median problem – algorithm and adversary lower bound.

11. Approximation algorithms

The oral re-exam will take place on June 26,27 for DM553 and June 28 for DM508. The sign-up sheets for the order in which students will be examined have been put up on the information board in the corridor outside the entrance to IMADA. If you do not put your name on then, Lone will put it on for you. You will receive a list through Blackboard of the order students in DM553 will take the exam along with a starting time for the first student to draw a question. The sign-up lists cannot be used to exactly calculate an exam time since some students may not show up. Since, as for all classes, the external examiner is only paid for students who are examined, not for sitting and waiting, if a student is not there, the next student on the list who is present will be taken. When there are no more students ready to be taken, the external examiner may leave, so show up plenty early to make sure you are examined. Two hours before your expected exam time is probably safe enough. The first few students should show up at the start time.)

You will draw a topic from the list of topics listed above. Students taking DM553 are responsible for the entire set of questions, but students taking an individual study to cover DM508 are responsible for only the last six questions. You will have 30 minutes to prepare your presentation. During this time you may use the book and your notes. You may also make short notes that will help you to organize your presentation, but that will have no other technical content. The exam will take about 25 minutes per person. Prepare your presentation so that it takes about 10 to 15 minutes. Make sure you cover the most important ideas from your topic, though this may mean that you need to skip some details. Your presentation may be interrupted with questions or cut short to go on to other topics. Towards the end of the exam, you will typically also be asked short questions from other parts of the course, not related to the material you talked about.

You may do your presentation in either Danish or English (though Danish is strongly recommended if it is your native language).

Please mail me if you have any questions.