Topics for the exam in DM553/MM850

The topics are:

1. Pumping lemmas, and pushdown automata and context-free languages

2. Turing machines

3. Decidability

4. Reducibility

5. NP-completeness proofs – examples.

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

7. Information-theoretic lower bounds (lower bounds proven by counting leaves in decision trees), especially the average case bounds for sorting by comparisons.

8. Adversary arguments – technique, examples (not median finding).

9. Median problem – algorithm and lower bound.

10. Approximation algorithms

11. Parameterized complexity

The oral exam will take place on June 22, 23, 24 and 25. There will be a prerequisite for taking the exam (a "forudsætingsprøve"). It will be announced in May, and you will have to upload something to Blackboard, saying when you would like your exam or that you have no preferences. If you have a very good reason for your preference, please state it in your uploaded file (another exam the same day is a much better excuse than having trouble getting out of bed in the morning). You should also write if this is a re-exam for you and you want the "topics/questions" from last year.

Note that the following does not hold if you have a Zoom exam.

You will draw a topic from the list of topics listed above, using the same method as described for the Zoom exam. You will have about 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 30 minutes per person. Prepare your presentation (before the day of the exam) 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 30 minute period, you will typically also be asked short questions 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).

Ask Joan if you have any questions.