Institut for Matematik og Datalogi
Odense Universitet

October 20, 1998
JFB

DM19 – E98 – Exam Questions

1. Information-theoretic lower bounds (lower bounds proven by counting leaves in decision trees), especially the worst case and average case bounds for sorting by comparisons.
2. Adversary arguments – technique, examples.
3. Matroids – definitions, examples.
4. All-pairs shortest paths.
5. Flows in networks – Ford-Fulkerson and Edmonds-Karp methods.
6. Flows in networks – Preflow-push algorithms.
7. Matching – bipartite and nonbipartite.
8. Proof that SATISFIABILITY is NP-complete.
9. NP-completeness proofs – examples.
10. Approximation algorithms for NP-complete problems.
11. RSA public-key cryptosystem and primality testing (Miller-Rabin).
12. Sorting networks.
13. Circuits for addition and multiplication.
14. Parallel algorithms – examples and techniques.
15. Parallel algorithms – CRCW vs. EREW, and Brent's theorem.
16. Fast Fourier Transform.
17. String matching.
18. Computational geometry – algorithms and techniques.

The form of the exam You will draw a topic from the list of topics listed above. You will have 30 minutes to prepare your presentation. During this time you can use the book and your notes. You can 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 you presentation so that it takes about 20 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 interupted 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.

The **preferred** language of the exam is English. However if you have any problems with that, feel free to speak Danish.