DM553 Lecture 11 — DM508 Lecture 2

Lecture, April 8

After an introduction to the course, we began on NP-Completeness, introducing the definitions of P, NP and reducibility, along with basic theorems. We covered much of chapter 7, up to, but not including Theorem 7.32. The definition of time complexity classes is on page 279 in Sipser’s textbook, and the definition of P is on page 286. The definitions of NP and NP-Complete are in sections 7.3 and 7.4 of Sipser’s textbook. Note that some of this is also in chapter 34 in the CLRS book (but in some cases CLRS is too informal).

Lecture, April 13

We will begin showing that 3-SAT and CLIQUE are NP-Complete. To do this, we assume that CNF-SAT is NP-Complete. The proof we will look at that 3-SAT is NP-Complete combines the proofs in both the Sipser and the CLRS books. Then we will cover the proof that SATISFIABILITY (actually CNF-SAT) is NP-Complete, from section 7.4 in Sipser’s textbook.

Lecture, April 15

We will do more NP-Completeness proofs from chapter 34 in CLRS.

Problems to be discussed in U14 on April 24

In the CLRS textbook, do the following:

1. 34.5-1, 34.5-2 (for 34.5.2, try a reduction from Vertex Cover, too).

2. 34.5-4. (you may check on pages 1228–1129 for a hint, which is 1044–1045 in the second edition).

3. 34.5-5 (Warning: it is tempting to think that this one is completely trivial; it is not. Also, to make this easier, you may redefine the Set Partition problem to allow the same value appearing more than once), 34.5-6.

4. 34-2, 34-3.

If not all problems are finished, the most important ones missed will be done later.