Institut for Matematik og Datalogi
Syddansk Universitet

April 11, 2018
JFB

DM553 – Complexity and Computability – 2018
Lecture 12

Lecture, April 10

We defined polynomial time reductions, co-NP, and NP-Completeness. Then, we showed that four problems were NP-Complete, assuming that CNF-SAT is NP-Complete. The proof that 3-SAT is NP-Complete combined the proofs in both the Sipser and the CLRS books. Then, we will show that CLIQUE, VERTEX COVER, and INDEPENDENT SET are NP-Complete.

Lecture, April 12

We will cover the proof that SATISFIABILITY (actually CNF-SAT) is NP-Complete, from section 7.4 in Sipser's textbook. We will also do more reductions from chapter 34 in CLRS.

Lecture, April 17

We will finish chapter 34 in CLRS. Then we will start on lower bounds from section 2.4 in the notes, which can be found through Blackboard, by clicking "Course Materials". (Part of this is also in section 8.1 of CLRS.)

Problems to be discussed on April 18

1. Do the following problems from CLRS left over from April 11: 34.2-5, 34.2-10, 34.4-4, 34.4-5, 34.4-6, 34.4-7.

2.
   - Do 34.5-1. Two graphs $G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$ are isomorphic if there exists a bijection (a function that is 1-1 and onto) $f : V_1 \to V_2$ such that for all $v_i, v_j \in V_1$, $(v_i, v_j) \in E_1$ if and only if $(f(v_i), f(v_j)) \in E_2$. The function f is called an isomorphism.
   - Now assume that you have a polynomial-time algorithm for solving the subgraph-isomorphism problem. Describe how to use this algorithm to find an isomorphism from the first graph to a subgraph of the second.

3. 34.5-2 – try a reduction from Vertex Cover, too.