

Instructions

- Discussion is allowed and in fact encouraged
- Answers must be written by yourself.
- All sources that are used to reach the solution must be mentioned.

- ① Prove the two claims from the notes of Lecture 21. [4+4]
- ② Prove that $P \subseteq NP \cap co-NP \subseteq EXP$. [5]
- ③ For languages A, B, C show that if $A \leq_p B$ and $B \leq_p C$, then $A \leq_p C$. [2]
- ④ Let ϕ be a boolean formula in CNF.
 - i) Show that $\neg \phi$ is in DNF.
 - ii) What can we say about the satisfiability of $\neg \phi$ if
 - a) ϕ is satisfiable?
 - b) ϕ is unsatisfiable?[1+1+1]