

Computational Complexity

Exercise Session 4

Exercise 1. Prove that $L \subseteq P$.

Definition 1. We define DP to be the following complexity class:

$$DP = \{ A \cap B \mid A \in NP, B \in \text{coNP} \}.$$

Exercise 2.

- (a) Explain the difference between DP and the class $NP \cap \text{coNP}$.
- (b) Prove that $NP \cup \text{coNP} \subseteq DP$.
- (c) Prove that $P = DP$ if and only if $P = NP$.

Exercise 3. Consider the problem SINGLE-CYCLE, where the input consists of an undirected graph $G = (V, E)$, and the question is to decide if G consists of one single cycle. Show that SINGLE-CYCLE is in L.