
Complexity Theory

Due date: June 23, 2014 before class!

Problem 1 (10 Points)

Describe a decidable language in $\mathcal{P}_{/poly}$ that is not in \mathcal{P} .

Problem 2 (10 Points)

A language $L \subseteq \{0, 1\}^*$ is *sparse* if there is a polynomial p such that $|L \cap \{0, 1\}^n| \leq p(n)$ for every $n \in \mathbb{N}$.

Show that every sparse language is in $\mathcal{P}_{/poly}$.

Problem 3 (10 Points)

The language CONNECTED from Problem Set 1 is in \mathcal{P} , hence it can be computed with a logspace-uniform circuit family. Describe the construction of such a circuit, when the input is given by the adjacency matrix A of a graph G , i.e. the input variables are the n^2 entries of A .

Problem 4 (10 Points)

Prove that $\mathbf{ZPP} = \mathbf{RP} \cap \mathbf{coRP}$.