
Complexity Theory

Due date: May 29, 2012 before class!

Problem 1 (10 Points)

- (i) Assume $A \preceq_m^p B$. Show that then also $\bar{A} \preceq_m^p \bar{B}$.
- (ii) Show that if a complexity class \mathcal{C} is closed under \preceq_m^p , then so is $\text{co-}\mathcal{C}$.
- (iii) Show that $\text{co-}\mathcal{NP}$ is closed under union and intersection.

Problem 2 (10 Points)

Show that there is a language $B \in \mathbf{EXP}$ such that $\mathcal{NP}^B \neq \mathcal{P}^B$.

Problem 3 (10 Points)

Show that $\mathbf{SPACE}(n) \neq \mathcal{NP}$. (Note that it is unknown if either class is contained in the other.)