Technische Universität München
Fakultät für Informatik
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Spring Semester 2014
Problem Set 6
May 26, 2014

Complexity Theory

Due date: June 2, 2014 **before** *class!*

Problem 1 (10 Points)

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

Problem 2 (10 Points)

Geography is a game where players take turns naming cities. Each city chosen must begin with the final letter of the previous chosen city. Repetition is not allowed. The game starts with an arbitrary starting city and a player loses if he or she is unable to continue. Define Generalized Geography as a generic graph problem and show that it is **PSPACE**-complete.

Problem 3 (10 Points)

Show the following claims:

1. 2Sat is **NL**-complete.
2. If $A \preceq_m^{\log} B$, then $A \preceq_m^p B$.

Problem 4 (10 Points)

Show that $\mathbf{SPACE}(\mathcal{O}(n)) \neq \mathcal{P}$.