

Advanced Complexity Theorie

SS 2011, Exercise Sheet #5

EXERCISE 8:

- a) Prove that the following problem is PSPACE-complete:

$$\{ \langle \mathcal{M}, 1^N \rangle : \text{DTM } \mathcal{M} \text{ terminates on the empty input using } \leq N \text{ tape cells} \}$$

- b) Construct and prove a problem EXPTIME-complete;
similarly for EXPSPACE.
- c) Construct a total monotone function $t : \mathbb{N} \rightarrow \mathbb{N}$ such that every decidable $L \subseteq \{0, 1\}^*$ has $L \in \text{DTIME}(t(n))$. Can you achieve t to be computable?
- d) Let A be PSPACE-complete. Prove: $\mathcal{P}^A = \mathcal{N}^{\mathcal{P}^A}$.