

Problems in Arora/Barak

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1 Chapter 3

Question 1.1. *Show that there is a language $B \in \mathbf{EXP}$ such that $\mathbf{NP}^B \neq \mathbf{P}^B$*

Question 1.2. *Show that there exists a function that is not time-constructible*

Proof. Consider the function $f(n) = \log \log n$. For any input x such that $|x| > \log \log |x|$, any TM would have insufficient time to read the tape for its input. \square