

20 Worksheet for Lecture 20 (Robust PCPs)

Problem 20.1 (robustification). Let \mathcal{L} be a language with a PCP with soundness error ϵ , alphabet Σ , proof length l , query complexity q , and randomness complexity r . Using an efficiently-decodable error-correcting code $C: \Sigma \rightarrow \{0, 1\}^{O(\log|\Sigma|)}$ with constant rate and relative distance δ , prove that \mathcal{L} has a *robust* PCP with robustness parameter $O(\delta/q)$, soundness error ϵ , alphabet $\{0, 1\}$, proof length $O(l \cdot \log |\Sigma|)$, query complexity $O(q \cdot \log |\Sigma|)$, and randomness complexity r .