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Modern Complexity Theory

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Assignment 7

Problem 20 (2 points)**:**
The definition of PCP requires that for every $x \in L$ there is a proof π_x for which it holds that $\Pr[M^{\pi_x}(x) = 1] = 1$. This means that π_x can be potentially different for every x. Show that this assumption is not necessary, that is, there exists a proof π which is common to all x's in L.

Problem 21 (4 points)**:**
Try to find a largest possible $\min\{r(\cdot), q(\cdot)\}$ for which $\mathrm{PCP}(r(\cdot), q(\cdot)) \subseteq \mathrm{P}$, and prove this for your choice.

Problem 22 (4 points)**:**

1. Explain how the proof of Theorem 7.3 can be extended to adaptive verifiers.
2. Show that any verifier in a $\mathrm{PCP}(log, O(1))$ system can be assumed to be non-adaptive.