

Homework 4

Due: May 2, 2018

1. Show that the class $\mathbf{ZPP} = \mathbf{RP} \cap \mathbf{co-RP}$.
2. Describe a *decidable* language that is in $\mathbf{P/poly}$ but not in \mathbf{P} .
3. A language $L \subseteq \{0, 1\}^*$ is *sparse* if there is a polynomial p such that $|L \cap \{0, 1\}^n| \leq p(n)$ for all n . Show that every sparse language is in $\mathbf{P/poly}$.
4. The class $\mathbf{P/log}$ is the class of languages decidable by a Turing Machines running in polynomial time that take $O(\log n)$ bits of advice. Show that $SAT \in \mathbf{P/log}$ implies $\mathbf{P} = \mathbf{NP}$.