Problem Set 7

Jaan Tollander de Balsch

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H7.1

Let $L \in \mathbf{ZPP} = \mathbf{RP} \cap \mathbf{coRP}$. Then we have two Monte Carlo Turing machines, N_1 which decides L and N_2 decides which $\bar{L}$. We compose PTM M using N_1 and N_2 such that:

1) If $x \in L$, then $x \notin \bar{L}$ and all computations for N_2 halt with "yes", thus $Pr[M(x) = 0] = 0$.
2) If $x \notin L$, then all computations for N_1 halt with "no", thus $Pr[M(x) = 1] = 0$
3) Otherwise $Pr[M(x) = ?] \leq (1/2)^2 \leq 1/3$.

The probability of getting a definite answers in k iterations is atleast $1 - 2^{-k}$ (polynomial). Consequence from condition (1) is that $M(x) = 1$ if and only if $x \in L$.

H7.2

H7.3