

Exercise 1

Prove or disprove: $BPP = BPP(0.19, 0.20)$

Exercise 2

Prove:

If $\Sigma_2 = \Pi_2$ then $PH = \Pi_2$.

Exercise 3

Given the string: $1^n \langle M \rangle$ (where $\langle M \rangle$ is the encoding of a $DSPACE(n^2)$ TM) define the following graph:

$$\begin{aligned} G_M^n &= (V_M^n, E_M^n) \\ V_M^n &= [n]^{\log n} \\ E_M^n &= \{(u, v) \mid (u, v) \in L_M\} \end{aligned}$$

(i.e. the edges are all the strings of length $2 \log n$ over alphabet of size n accepted by M)

Prove: $st-CONN - G_M^n \in co-NSPACE(\log^2 n) - Complete$

GOOD LUCK