CS 1511 Homework 15

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29.)

Let L ∈ BP · NP.

∃TM T and ∃Integer k such that:

$\forall x \forall R$ T(x,R) halts in $\mid x \mid^k$ steps

x ∈ L iff prob(T(x,R) ∈ 3-SAT) ≥ 3/4

x ∉ L iff prob(T(x,R) ∈ 3-SAT) ≤ 1/4

First off, we will ignore the second tape in this T.

We will create our circuit C to accept two inputs (x,y) with x being an encoding of T.

The y will be hardwired to be our correct set R. Below is how we will build this correct set.

If this machine is run n^2 times, then the prob(T is wrong) becomes $< 1/4^n$ according to statistics.

If we get wrong answers, we can simply throw them away. We build R from the correct set. By the union bound, $\forall n$, ∃ R such that $\forall$ x $\mid x \mid$ = n implies T(x, R) is correct. We just need to find an R that works.

$\exists C_n$ family of circuits $\{C_n\}_{n \geq 1}$ such that

L ∈ NP/Poly