Home Work #1

2018320161 컴퓨터학과 송대선

If SAT belongs to P, then there exists an algorithm that can decide whether there exist an assignment that make boolean formula(ϕ),which is a yes instance of SAT, become 1(true) in polynomial-time.

Let`s call that algorithm "A".

We can make an algorithm that finds a certificate of given yes instance of SAT, by calling the algorithm "A" polynomial times.

Let`s call an yes instance ϕ, whose boolean variables $x_1, x_2, ..., x_n$.

And let ϕ_0 be the yes instance whose x_1 = 0, ϕ_0 be the yes instance whose x_1 = 1,

let $\phi_{0,0}$ be the yes instance whose x_1 = 0 $x_2 = 0$, $\phi_{1,1}$ be the yes instance whose x_1 = 1, $x_2 = 1$.

for loop this if-else code n times

    for k in range(1, k)

        if A($\phi_{x_1,x_2,...,x_{k-1},0}$) is 1, then $x_k = 0$ (1 ≤ k ≤ n)

        else, then $x_k = 1$

After the for loop, return $x_1, x_2, ..., x_n$.

The algorithm above takes n*(A time complexity which is polynomial).

So, There exists the algorithm that finds a certificate of given yes instance of SAT in polynomial times.