

Week 13 Tutorial Session

(1) Prove that the following languages are NP-complete:

(a) $L_1 = \{\langle \varphi \rangle \mid \varphi \text{ is a boolean formula with at least two satisfying assignments}\}$

(b) $\text{HALF-CLIQUE} = \{\langle G \rangle \mid G \text{ is a graph on } n \text{ vertices containing a clique of size at least } n/2\}$

(2) Consider the following language:

$$L = \{\langle M \rangle \mid M \text{ does not accept } \varepsilon\}.$$

Prove that L is unrecognizable by *directly reducing* from $\overline{A_{\text{TM}}}$, where

$$\overline{A_{\text{TM}}} = \{\langle M, w \rangle \mid \text{Turing machine } M \text{ rejects or infinite-loops on input } w\}$$

is a known unrecognizable language.