Week 12 Tutorial Session

(1) Consider the language

$$L = \{\langle G_1, G_2 \rangle \mid G_1, G_2 \text{ are context-free languages and } L(G_1) = L(G_2)\}$$

(a) Show that L is undecidable.

(b) What is $\overline{L}$? Show that $\overline{L}$ is recognizable.

(c) Show that L is unrecognizable.

(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.