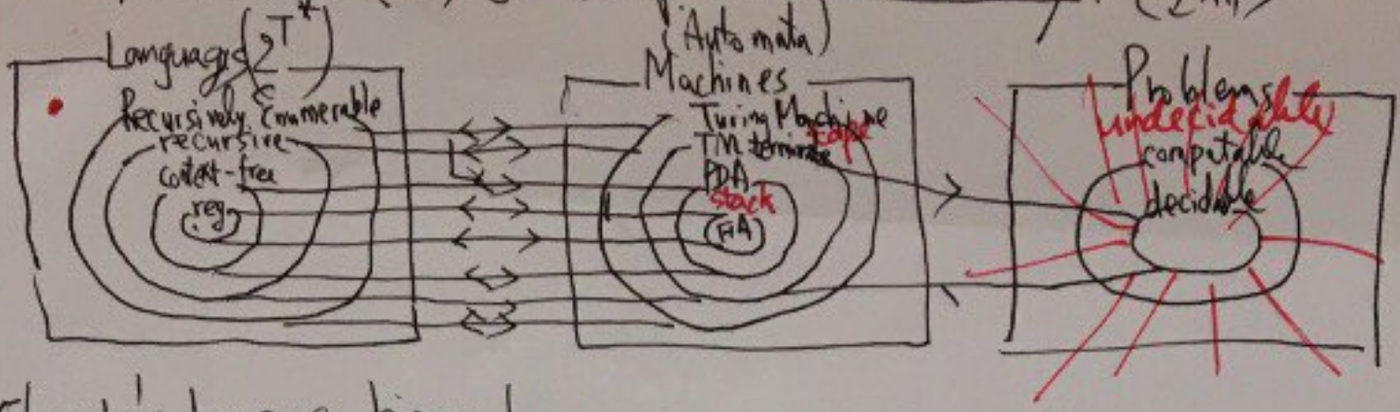
12/6 (수) 24(-3)강 Chap 9. Undecidability. (문제)



Chomsky's Language hierarchy

Type -1 non R.E.

Type 0 R.E. Computable

Type 1 recursive ≡ programmable.

Type 2 Context-free

Type 3 regular

17.2 Turing Machine

Codetor

Turing Machines $\longleftrightarrow$ $\mathbb{N}$

Turing Machine is countable

Turing machine is enumerable

에 차례수로 번호를 붙일수 있다.

$M : TM \leftrightarrow \mathbb{N}$

$M_i \in TM$

$\Sigma^* : \leftrightarrow \mathbb{N}$

$w_i \in \Sigma^*$ — 예를 들어서 사전TP 18p의 lexicographic order ↔ length first alphabet order 2nd.

2^{Σ^*} ... uncountable.

(Mi, Wi) pair

$L_u = \{ w_i \in T^* \mid w_i \in L(M_i) \}$ Universal Language

$L_d = \{ w_i \in T^* \mid w_i \notin L(M_i) \}$ Diagonal "

L_u, L_{ne} is R.E., $L_d = \overline{L_u}$, $L_e = \overline{L_{ne}}$ is not R.E!

Language & Problem

Lang: $\Sigma^* \to \{0,1\}$ $\quad |\{0,1\}|^{|\Sigma^*|} = 2^{|\mathbb{N}|}$

Prob: $D \to \{0,1\}$ $\quad |\{0,1\}|^{|D|=|\mathbb{N}|} = 2^{|\mathbb{N}|}$

$(=|\mathbb{N}|)$

Lang. Prob. uncountable

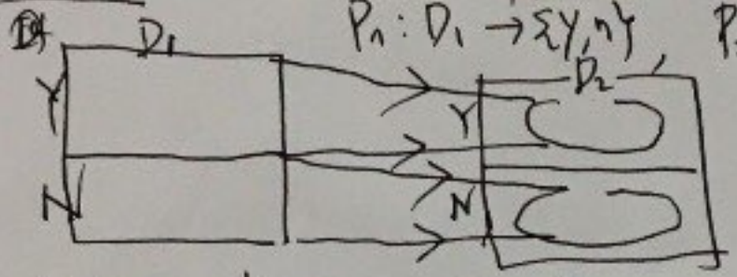
$\therefore$ Lang $\equiv$ Prob.

$f: A \to B$

$|f| = |B|^{|A|}$

Reduction of the Problem P_1 to P_2 (written $P_1 \leq P_2$)

$P_1: D_1 \to \{Y, n\}$, $P_2: D_2 \to \{Y, n\}$



P_2 is not easier than P_1.

$\equiv$ P_2 is at least as hard as P_1

$\equiv P_1 \leq P_2$

Def A problem is trivial, if either yes-instance or no-instance of the problem is empty.

Rice Theorem

Every non-trivial property of the R.E languages (sets) are

undecidable.

$\equiv$ RE or non-RE.