1)

11/29 (Tue) Turing-Church's Thesis - 1. (-5)

non-RE — Russel's paradox → $L_d = \{M_i \in \Sigma^* \mid x_i \notin L(M_i)\}$ L_e

↕ complement

RE but not Recursive. → $L_u = \{M_i \in \Sigma^* \mid x_i \in L(M_i)\}$ L_{ne}

(x_i, M_i)

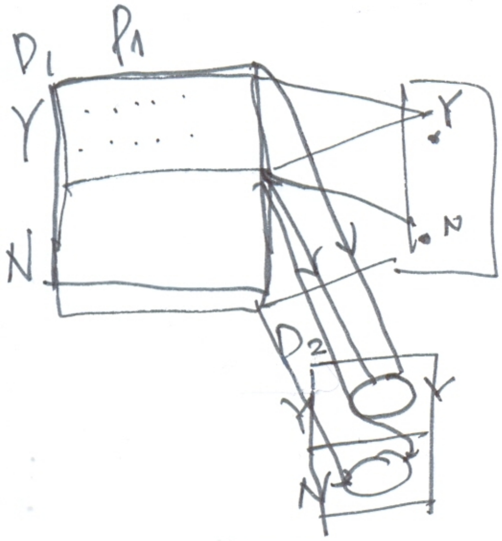
$L_d = \overline{L_u}$

$L_u = \overline{L_d}$

Reduction of a Problem P_1 to another problem P_2

$P_1 : D_1 \to \{Y, N\}$

$P_1 \le P_2$ $\qquad$ $P_2 : D_2 \to \{Y, N\}$



$P_1(Y_{D_1}(D_1)) \subseteq Y_{D_2}(D_2)$

$P_1(N_{D_1}(D_1)) \subseteq N_{D_2}(D_2)$

$P_1 \not> P_2$

$\equiv$ $P_1 \le P_2$

NP Complete (강)
SAT: Satisfiability Prob.
SAT $\le_P$ P

If $\exists$ P? reduces to P.
L_u

$L_u \le P$ → P is RE but not recursive
or non-RE

nondecidable.

Thm 9.11

Rice's Theorem

Every nontrivial Problems on R.E languages are R.E.

Turing's Theis

TM is computable

Every problem that is solved by
can be

Church's Theis

μ-recursive (partial) function is computable

Every problem that can be defined by

Turigg-Church's Thesis

$$TM = \mu\text{-r.p.f.}$$

μ-recursive function

partial recursive function

+ $\underline{\mu}$ - recursion

↓

(minimization)