1. Logic

1.1 proposition

$p ::= \mathbb{T} \mid \mathbb{F} \mid v \mid \neg p \mid p \wedge q \mid p \vee q \mid p \oplus q \mid p \to q \mid p \leftrightarrow q \mid (p)$

$\neg p \vee q$

→ well formed (syntax)

Equivalence of propositions

1.2 $p \Leftrightarrow q$ $\equiv$ $\leftrightarrow$

① Truth table n var. 2^n

② Rules

Ven diagram (set)

1.3 Predicate = prop. + variable

$P(x)$ $x \in X = \{x_1 \ldots x_n\}$

↳ set of discourse

$x := x_1 \in X$ $P(x)$ — proposition (X)

$P(x_1)$ — " (O)

binding ① constant binding

② quantifier $\forall, \exists$ ⟹ proposition

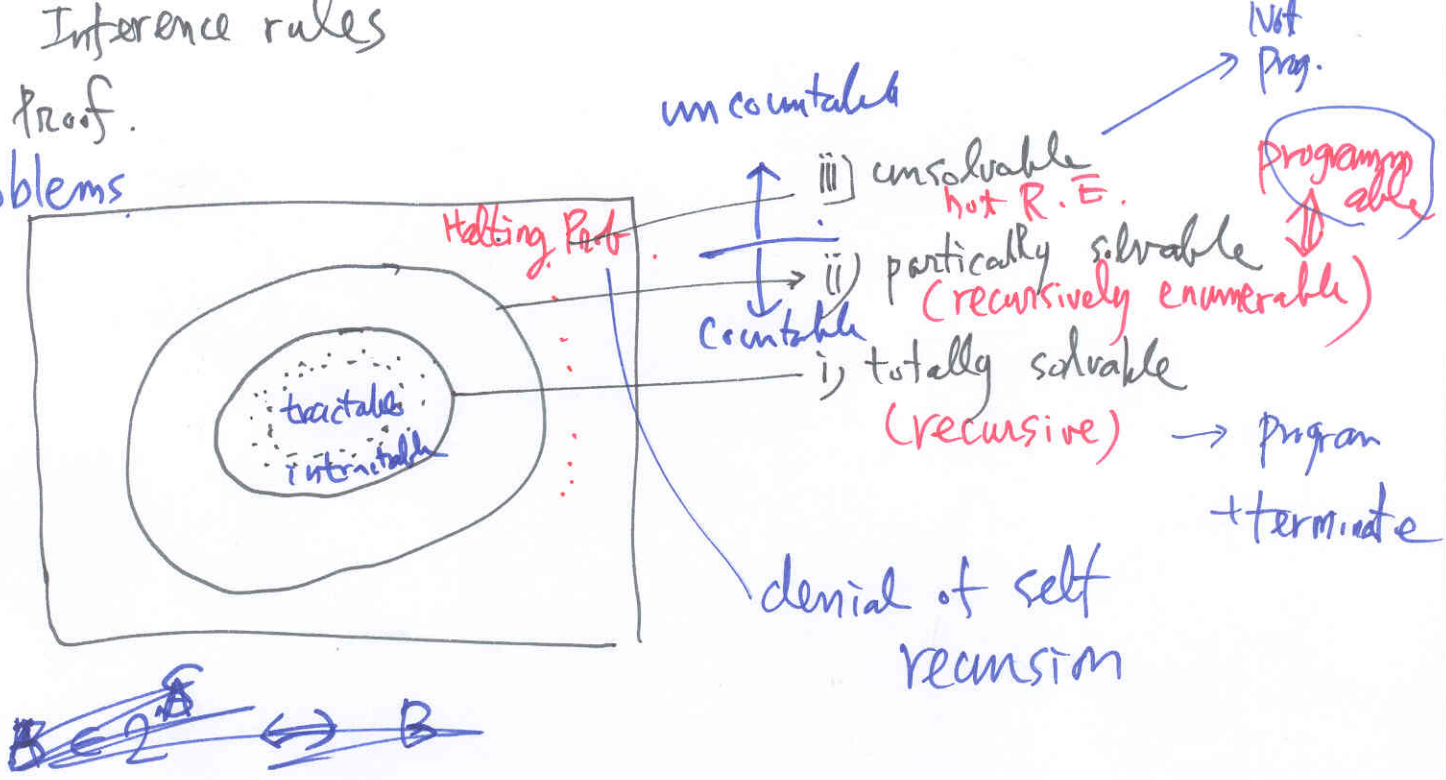
1.5. Inference

Hypothesis ⇒ ○ ⇒ ○ ⇒ ○ ⇒ ○ ⇒ conclusion

Inference rules

1.6 Proof.

Problems



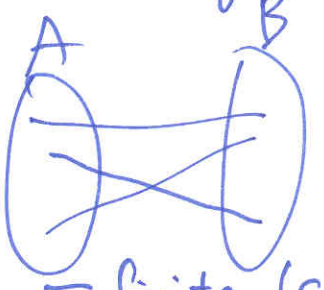
$B \in A \leftrightarrow B$

$A \in 2^S$ $A \subseteq S$

$A \times B$

2.3 functin

Relation < total unique — inverse ftn — onto 1-1 >



$A \cong_f B$

cardinality
- finite (countable)
- Countably infinite
- uncountable

chap3 Alg.

Big O $O(1) \subset O(\log n) \subset O(n) \cdots \subset O(n^k) \cdots \subset O(2^n) \subset \cancel{O(4^n)} \cdots O(n!) \subset O(n^n)$

(H)

Nondeterminism

Next steps is More than two

decision tree

path's : $O(2^n)$ (n = d)

P is NP-complete, if

i) NP;

ii) $\forall P' \in$ NP-complete, P' is at least as diff. cult as P.

Chap8 Relation

$R \subseteq A \times A$ < set of pairs / boolean operation

ref. sym. tran. — closure

anti symmetric

$R \cup id_A$ $\quad R \cup R^{-1}$ $\quad R^+ = \bigcup_{i=1}^{\infty} R^i$

ref. tran. closure $R^* = \bigcup_{i=0}^{\infty} R^i$

Equiv. relation ⟷ partition

$O(n^2)$ $\quad O(n)$

Partial order. (poset) — ref. antisym, tran.

Hasse diagram

$(A, \leq)$: lattice < unique lub / " glb ∀ pairs in A

l.u.b: / g.l.b: > $A \times A \to A$ closed. (algebraic system)

$+ : \mathbb{N} \times \mathbb{N} \to \mathbb{N}$ closed(i)

4/20 (Fri.) pm 2:00 ~ 4:00 공동강의실

Open book