1) 3/2. Predicate Logic. 1

∨ and ∧ are $\boxed{\text{associative}}$ binary op ⇒ n-ary op.

$(p \vee q) \vee r = p \vee (q \vee r)$

$\bigvee_{k=1}^{n} P_k = \boxed{P_1 \vee P_2 \vee \cdots \vee P_n} = (\cdots((P_1 \vee P_2) \vee P_3 \vee \cdots \vee P_{n-1}) \vee P_n$

↳ well defined $= (P_1 \vee \cdots (P_{n-2} \vee (P_{n-1} \vee P_n))$

+ is associative ... $+ : \mathbb{N} \times \mathbb{N} \to \mathbb{N}$ binary operation (function)

$\sum_{m=1}^{k} a(m)$, $a(m) = a_m$ $\sum_{k=1}^{100} k$

$1+2+3 \cdots +100$

※ Cartesian Product of set A, B

$A \times B = \{(a,b) \mid a \in A, b \in B\}$

ordered pair (순서쌍)

$(a,b) \neq (b,a)$

$\bigvee_{k=1}^{n} P_k$, $\bigwedge_{k=1}^{n} P_k$ — well defined

De Morgan's Law

$\neg\left(\bigvee_{k=1}^{n} P_k\right) = \bigwedge_{k=1}^{n} (\neg P_k)$

...

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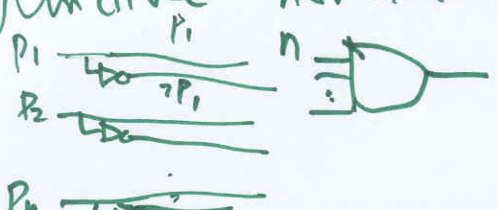
↔

Disjunctive normal form .... truth table



$\vee (n \wedge)$

↑ P_i or $\neg P_i$

2) 1.3 Predicate and Quantifiers

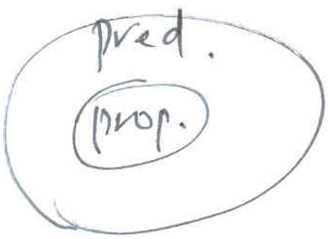
$P(x)$ ... proposition + <u>variable</u> = predicate

Is predicate $P(x)$ proposition? ×

<u>$P(4)$</u> ... O

<u>$P(2)$</u>

Proposition is a predicate with zero variable $n \geq 1$



$n \geq 0$

Consider

x^n $n \geq 1$, $n \geq 0$, $n \in \mathbb{Z}$, $n \in \mathbb{Q}$, $n \in \mathbb{R}$