3/8(木) 제3강 binary relation, graph, equivalence rel. partition partial order, function

$R \subseteq A \times A$ $\quad G=(V,E)$

R^n $\quad V \times V \subseteq E$

$a \not R b$ $\quad a, b \in V.\ aR^2b$

aRb $\quad aR^9b$
aR^2b $\quad aR^{10}b$
aR^4b $\quad \vdots$

$R^* = \bigcup_{i \in N_0} R^i$

$R^+ = \bigcup_{i \in N_1} R^i$

where $N_0 = \{0, 1, 2, \dots\}$
$N_1 = \{1, 2, 3, \dots\}$

Equi. rel. on A $\longleftrightarrow$ partition on A.

$Par(A) = \{A_1, A_2, \dots, A_k\}$
where ① $\bigcup_{i=1}^{k} A_i = A$ and ② $1 \le i \ne j \le k$ $A_i \cap A_j = \emptyset$
① exhaustive ② mutually disjoint.

$\cong\ \subseteq U \times U$ $\quad |A| = |B| \Rightarrow A \cong B$

$= \subseteq N \times N$ $\quad$ Equiv. rel $\cong$ on U 로 정의된 partition

$\leftrightarrow N$.

R^*: reflexive-transitive closure of R
R^+: transitive closure of R.

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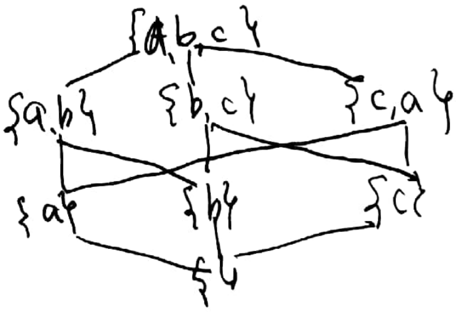
poset ref., antisymmetric, transitive
/irref

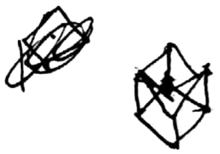
$(A, \le)$

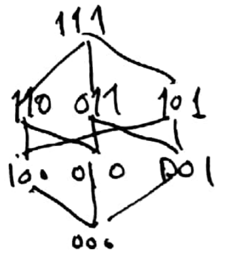
$\exists_1$ lub, glb

Ex: $(2^A, \subseteq)$ is a lattice poset.

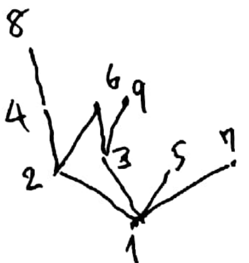
$A = \{a, b, c\}$







$(N_1, |)$ is a lattice



소인수 분해
최소공배수 (lub)
최대공약수 (glb)

function f from A to B

$f: A \to B$. $(f \subseteq A \times B \wedge \forall a \in A, \exists_1 f(a) \in B)$

① ~~uniqueness~~ total ② uniqueness

$|A| \overset{?}{\lesseqgtr} |B|$

1-1 $|A| \leq |B|$

onto $|A| \geq |B|$

1-1 & onto $|A| = |B|$ — $A \cong_f B$

|| bijection $f: A \xleftrightarrow[\text{onto}]{1:1} B$