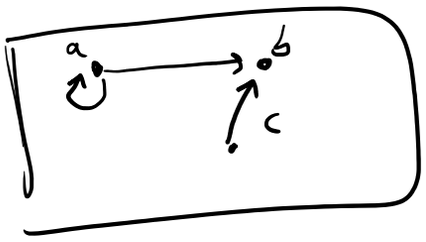
T, S sets. A relation between T and S is

$$R \subseteq T \times S$$

in particular: $T = S$ S (binary relation)

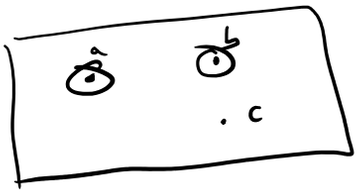
$$R \subseteq S \times S$$

$$R = \{(a,b), (a,a), (c,b)\}$$



unary relation on S : $R \subseteq S$

$$R = \{a, b\}$$



$S = \{1, 2, 3\}$

relation: $\leq$

$"\leq" \subseteq S \times S$

$= \{(1,1), (1,2), (1,3), (2,2), (2,3), (3,3)\}$

"≤ 12" "$1 \leq 2$"

"Rab" "aRb"

Models:

$\forall x (P_x \vee \neg P_x)$

always holds

in all models

$\forall x (P_x \to Q_x)$

Model:

Set $\{a, b\} = D$

$Q = \{a\}$

$P = \{b\}$

Then $P_b \to Q_b$ false

Thus $\forall x (P_x \to Q_x)$ does not hold in this model.

$\{d, v, w\} = D$

$I(d) =$  $I(w) =$ 

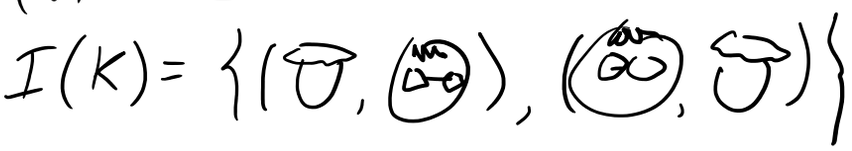
$I(v) =$ 

relation: K = knows (binary)

w knows v ✓

v knows w

$K = \{(v, w), (w, v)\}$

$I(K) =$ 

g = identity function

$g[x :=$  $]$