

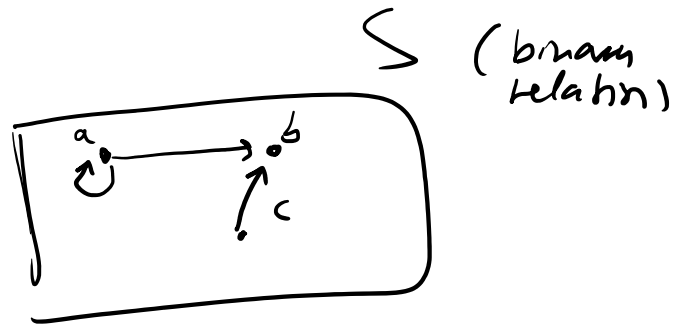
T, S sets. A relation between T and S is

$$R \subseteq T \times S$$

in particular: $T = S$

$$R \subseteq S \times S$$

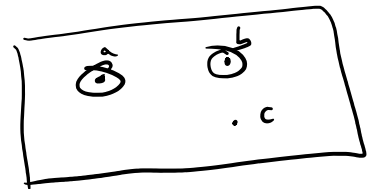
$$R = \{(a, b), (a, a), (c, b)\}$$



unary relation on S :

$$R \subseteq S$$

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



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

relatns: \leq

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

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

$$"\leq 12"$$

$$"Rab"$$

$$"1 \leq 2"$$

$$"aRb"$$

Models:

$\forall x (p_x \vee \neg p_x)$
always holds
in all models

$$\forall x (p_x \rightarrow Q_x)$$

Model:

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

$$Q = \{a\}$$

$$p = \{b\}$$

Then $p_b \rightarrow Q_b$ false

Thus $\forall x (p_x \rightarrow Q_x)$
does not hold in this model.

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

$$I(d) = \text{[drawing of a person with a bow]} \quad I(w) = \text{[drawing of a person with a bow]}$$

$$I(v) = \text{[drawing of a person with a bow]}$$

relation:

$$K = \text{knows (binary)}$$

w knows v

v knows w

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

$$I(K) = \{(\text{[drawing of person v]}, \text{[drawing of person w]}), (\text{[drawing of person w]}, \text{[drawing of person v]})\}$$

g = identity function

$$g[x := \text{[drawing of person w]}]$$