

Foundations of Knowledge Representation

Inconsistency Handling Problems

Problem 1. *The relation $\Sigma \vdash \phi$ between sets of propositions and propositions is defined by: there is derivation with conclusion ϕ and with all hypotheses in Σ .*

We say that ϕ is derivable from Σ .

Prove that:

If Σ is maximally consistent, then Σ is closed under derivability (i.e. $\Sigma \vdash \phi \Rightarrow \phi \in \Sigma$).

Problem 2. *Consider the definition of a setup in four-valued logic. Complete the mapping for the case where an atomic formula p is denied.*

Problem 3. *Show that $*$ is not commutative, i.e., there are $\mathcal{B}, \alpha, \beta$ such that:*

$$(\mathcal{B} * \alpha) * \beta \neq (\mathcal{B} * \beta) * \alpha \quad (1)$$

Problem 4. *Recall the fourth postulate for contraction:*

$$(\mathcal{B} \dot{-} 4): \text{ If } \varphi \in \mathcal{B}, \text{ then } \mathcal{B} \subseteq (\mathcal{B} \dot{-} \varphi) + \varphi. \quad (2)$$

This so-called recovery postulate can be seen as the most debated postulate of belief change.

- 1. Can you think of an intuitive example that validates the recovery postulate?*
- 2. Can you think of an example that illustrates that it does not hold in general?*