

Task7 Could the modality be defined as a boolean function?

(2 points)

Deadline: Monday 22.5. 2017 9:00 am

Let us consider for simplicity only Kripke structures with a single agent whose knowledge is described by the modal operator K . We know that in all the corresponding Kripke structures where K is interpreted by equivalence there holds for any formula α

- a) the formula $K\alpha \rightarrow \alpha$ (Knowledge Axiom) is valid ,
- b) but the formulas $\alpha \rightarrow K\alpha$ and $\neg K\alpha$ are not valid.

Utilize these facts to show that such a behaviour of the modal operator K cannot be encoded by any boolean function (ie. Truth values defined by a table).

Hint: Suppose the truth value of $K\alpha$ can be calculated from the truth value of α using a truth table for K (in the same way as $\neg\alpha$ is calculated from α). Consider all possible truth tables for K and show that none of them grants the properties a) and b) mentioned above.