Assignment sheet 4

Künstliche Intelligenz

Benzmüller & Schommer Summer 2019

Exercise 11: Reasoning in Different Calculi and Approaches

Given the following propositional logic formula:

$$((r \vee q) \wedge (p \Rightarrow \neg q) \wedge \neg(p \wedge r)) \Rightarrow \neg p$$

Please analyse whether this formula is *valid (i.e., a theorem)*. Please do this with each of the following methods from the lecture:

(i) DPLL

(iii) Tableaux

(iv) Is SLD Resolution also applicable? If yes, then present a proof. If not, then please explain why not.

Exercise 12: Modal Logic

Show that the following propositional modal logic formula is valid in logic S5:

$$(\Box\Diamond(\Box A \Rightarrow \Box\Diamond B)) \Rightarrow (\Box A \Rightarrow \Box\Diamond B)$$

In which weaker logics is the formula valid as well, and which ones not?

Exercise 13: Modal Logic (contd.)

Determine those logics from the modal logic cube in which the following formulas are valid. Give a proof or justification in each case.

- $\Diamond(A \Rightarrow \Box A)$
- $(\Box A \wedge \Box B) \Rightarrow \Box(\Box B \wedge \Box A)$
- $(\Diamond\Box A) \Rightarrow \Box A$
- $\Box A \vee \Box\neg\Box A$