TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Computer Science Institute of Theoretical Computer Science, Chair of Automata Theory

Description Logics

Exercise Sheet 6

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Exercise 23

Prove by induction Lemma 4.5 from the lecture.

Exercise 24

Prove Lemma 4.6 from the lecture.

Exercise 25

Prove that the lazy expansion rule $\equiv_-$ preserves consistency.

Exercise 26

Compare the tableau algorithm (with eager expansion) to the tableau algorithm extended with the $\equiv_+$- and $\equiv_-$-rules (lazy expansion) by applying both methods to check whether A is satisfiable w.r.t. $\mathcal{T}$, where

$$\mathcal{T} := \{A \equiv \neg B \sqcap B,\ B \equiv \exists r.\exists s.(C \sqcap D)\}.$$

a) What is the maximal number of complete ABoxes obtained in the set of ABoxes by eager expansion? What is the minimal number for lazy expansion?

b) What is the maximal number of rule applications by eager expansion? What is the minimal number for lazy expansion?

c) What is the maximal number of assertions in the biggest complete ABox obtained by eager expansion? What is the minimal number for lazy expansion?

d) Give $\kappa(M)$ for all sets M of ABoxes considered in the tableau algorithm with eager expansion.

e) Give $\kappa_{\mathcal{T}}(M)$ for all sets M of ABoxes considered in the tableau algorithm with lazy expansion.