TECHNISCHE UNIVERSITÄT DRESDEN

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

Fuzzy Description Logics

Exercise Sheet 6

Dr. Rafael Peñaloza / Dr. Felix Distel
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Exercise 1

Prove or disprove. For any t-norm $\otimes$ the following equivalences hold:

- $\neg(C \sqcup D) \equiv \neg C \sqcap \neg D$
- $\neg(C \sqcap D) \equiv \neg C \sqcup \neg D$

Exercise 2

Decide whether the following instances of PCP have a solution or not.

- $\{(00, 1), (11, 1), (0, 00)\}$
- $\{(0, 1), (01, 0), (1, 0)\}$
- $\{(0, 01), (1, 01), (101, 10), (00, 0)\}$
- $\{(01, 010), (100, 00), (010, 100)\}$

Exercise 3

Let A be a concept name. Construct a Lukasiewicz-$\mathcal{ALC}$ ontology such that $A^{\mathcal{I}}(x) \in \{0.25, 0.75\}$ for every model $\mathcal{I}$ and $x \in \Delta^{\mathcal{I}}$.

Exercise 4

For which of the three standard t-norms $\otimes$ are the following $\otimes$-$\mathcal{ALC}$ ABoxes consistent?

- $\mathcal{A}_1 = \{\langle A(a), 0.5\rangle, \langle \neg(A \sqcap A), 1\rangle\}$
- $\mathcal{A}_2 = \{\langle \forall r.A(a), 1\rangle, \langle \exists r.\neg A(a), 0.1\rangle$