



## Fuzzy Description Logics

### Exercise Sheet 10

Dr. Felix Distel  
Summer Semester 2013

#### Exercise 40

Check for which of the three fundamental continuous t-norms the following equalities hold. Provide a proof or a counterexample when appropriate.

- a)  $\ominus \ominus x = x$
- b)  $x \Rightarrow y = \ominus x \oplus y$
- c)  $x \oplus y = \ominus(\ominus x \otimes \ominus y)$
- d)  $x \otimes \ominus x = 1$
- e)  $x \otimes (x \Rightarrow y) = x \otimes y$

#### Exercise 41

Consider the logic  $\otimes$  –  $\mathcal{ALC}$  with the product t-norm and  $=$ -axioms. Let  $w$  be a word over the alphabet  $\{1, \dots, s\}$ . Let  $V, U$  be concept names. Define

- a function  $e: \{1, \dots, s\}^* \rightarrow [0, 1]$ , and
- an ontology  $\mathcal{O}$ ,

such that every model  $\mathcal{I}$  of  $\mathcal{O}$  satisfies

$$V^{\mathcal{I}}(x) = e(v) \implies U^{\mathcal{I}}(x) = e(vw)$$

for all  $x \in \Delta^{\mathcal{I}}$ .