

Assignment 3

Total marks: 80.

Out: November 16

Due: November 30 at 17:30

Note: Your report for this assignment should be the result of your own individual work. Take care to avoid plagiarism (“copying”). You may discuss the problems with other students, but do not take written notes during these discussions, and do not share your written solutions.

1. Use the tableau method for \mathcal{ALC} described in Baader and Sattler’s paper to check whether the following concepts are satisfiable/consistent. Show the steps and rules that are used. If the concept is satisfiable give the models (satisfying interpretations) obtained by the method. [20 points]

a) $(\forall R.\forall R.\forall R.\exists R.\neg D) \sqcap (\forall R.\forall R.\exists R.C)$
 $\sqcap (\forall R.\exists R.B) \sqcap (\exists R.A) \sqcap \forall R.\forall R.\forall R.\forall R.D$

b) $(\exists R.A) \sqcap (\forall R.\exists R.(\exists R.A \sqcup \exists R.\neg B))$
 $\sqcap (\forall R.\forall R.\exists R.C) \sqcap (\forall R.\forall R.(\forall R.\neg A \sqcup \forall R.B \sqcup \forall R.\neg C))$

2. Exercise 1, part (b), (c), (d), and (e), of Chapter 11 in the textbook. [30 points]

3. Exercise 3 of Chapter 12 in the textbook. [30 points]

Bonus Problem: Exercise 4 of Chapter 11 in the textbook. [8 points]