Assignment 2

Total marks: 80.

Out: October 22
Due: November 13 at 5pm

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. Exercise 1 of Chapter 6 in the (Brachman and Levesque) textbook. [30 points]

2. Exercise 2 of Chapter 9 in the textbook. [20 points]

3. 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 model (satisfying interpretation) obtained by the method. [20 points]

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

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

Bonus Implement a tableau method consistency checking procedure for $\mathcal{ALC}$ in Prolog. Test it on the examples in the previous question and on your own examples. Give a clear specification of how $\mathcal{ALC}$ concepts are represented in Prolog. Marks will be given for returning a satisfying interpretation when the concept is consistent. [10 points]