

8. Perfect Reformulation and Tableaux

Exercise 8.1 Rewriting of conjunctive queries with respect to a *DL-Lite* ontology with PerfectRef.

1. Compute the perfect reformulation for the following queries:

(a) $q(x, y) \leftarrow A(x), R(x, y), C(y)$

(b) $q(z) \leftarrow S(y, z)$

(c) $q(z) \leftarrow S(x, y), S(y, z)$

with respect to the TBox \mathcal{T} consisting of the following inclusion assertions:

$$\begin{aligned} A &\sqsubseteq \exists R \\ \exists R^- &\sqsubseteq B \\ B &\sqsubseteq A \\ R^- &\sqsubseteq S \end{aligned}$$

2. Answer the above queries over the ontology $\langle \mathcal{T}, \mathcal{A} \rangle$, where $\mathcal{A} = \{A(c)\}$.

Exercise 8.2 Consider the following \mathcal{ALC} concepts:

1. $(\exists R.A \sqcap \exists R.B) \sqcap \neg \exists R.(A \sqcap B)$

2. $(\text{Person} \sqcap \forall \text{eats.Plants}) \sqcap \neg (\text{Person} \sqcap \forall \text{Eats}.(plants \sqcup \text{dairy}))$

3. $A \sqcap \exists P.(\forall Q.(B \sqcup \neg C)) \sqcap \forall P.(\exists Q.C \sqcap \exists Q.\neg B)$

(a) Determine, using tableaux, whether these concepts are satisfiable.

(b) If they are satisfiable, construct from the tableaux the canonical interpretation.