EXERCISE 8

Science of Computational Logic

Steffen Hölldobler, Tobias Philipp

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Problem 8.1

Consider the default knowledge base $\langle \mathcal{F}_D, \mathcal{F}_W \rangle$ with

$$\mathcal{F}_D = \left\{ \frac{bird(X) : fly(X)}{fly(X)} \ , \ \frac{fly(X) : happy(X)}{happy(X)} \ , \ \frac{fly(X) : hungry(X)}{hungry(X)} \right\}$$
$$\mathcal{F}_W = \{ \ bird(tweety) \ , \ \ hungry(X) \rightarrow \neg happy(X) \ \}$$

1. Find two different extensions of $\langle \mathcal{F}_D, \mathcal{F}_W \rangle$
   and verify them by means of Theorem 11.7.
2. Find formulas G and G' such that $\langle \mathcal{F}_D, \mathcal{F}_W \rangle \models_c G$ and $\langle \mathcal{F}_D, \mathcal{F}_W \rangle \models_s G'$.

Problem 8.2

Prove theorem 11.7 of the lectures:

> Let (K_D, K_W) be a closed default knowledge base and K be a set of sentences.
> Define $K_0 = K_W$
> and for $i \geq 1$:
> $K_{i+1} = C(K_i) \cup \{H \mid G : G_1, ..., G_n / H \in K_D, G \in K_i$ and for all $1 \leq j \leq n : \neg G_j \notin K\}$.
> Then, K is an extension of (K_D, K_W) if $K = \bigcup_{i=0}^{\infty} K_i$.