Science of Computational Logic

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Problem 7.1

Consider the language $\mathcal{L}(\mathcal{R}, \mathcal{F}, \mathcal{V})$, with $\mathcal{R} = \{p/0, q/0\}$.
Given the set of formulas $\mathcal{S} = \{p \leftarrow \neg q, q \leftarrow \neg p\}$

1. Compute $C_{CWA}(\mathcal{S})$.

2. Compute the completion $C_C(\mathcal{S})$.

Problem 7.2

Give a logic program $\mathcal{P}$ and its completion $C_C(\mathcal{P})$ such that the following holds:

$$\{\neg A \mid \neg A \in C(\mathcal{P})\} \neq \{\neg A \mid \neg A \in C_C(\mathcal{P})\}$$

(Justify your answer.)

Problem 7.3

Find non-stratisfiable programs K_1 and K_2 such that

- $C_C(K_1)$ is satisfiable, and

- $C_C(K_2)$ is unsatisfiable.

Problem 7.4

Reiter asked about representing "Quakers are normally pacifists and Republican are normally non-pacifists. How about Nixon, who is both a Quaker and a Republican".

Consider the following formula:

$$(\forall X)\text{pacifist}(x) \leftarrow \text{quaker}(x) \wedge \neg\text{abnormal}(\text{aspect1}, x)$$

$$(\forall X)\neg\text{pacifist}(x) \leftarrow \text{republican}(x) \wedge \neg\text{abnormal}(\text{aspect2}, x)$$

$$\text{quaker}(\text{nixon}) \wedge \text{republican}(\text{nixon})$$

What happens when we circumscripe the predicate abnormal regarding the question whether Nixon is a pacifist?