

Foundations of Logic Programming

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Exercise 7.1

Take the following program P :
$$\begin{aligned}
 p &\leftarrow \\
 p &\leftarrow p \\
 q &\leftarrow r \\
 q &\leftarrow \neg r, p \\
 r &\leftarrow \neg p \\
 t &\leftarrow q \\
 t &\leftarrow r, \neg q
 \end{aligned}$$

- a) Using the “leftmost” selection rule, show the sequence of pre- SLDNF -trees which leads to a successful SLDNF -tree for

$$P \cup \{q\}.$$

- b) Compute $\text{Comp}(P)$.
- c) Construct the dependency graph D_P of P . Is P stratified?

Exercise 7.2

Consider the program P :
$$\begin{aligned}
 (1) \quad & \text{num}(0) \\
 (2) \quad & \text{num}(s(x)) \leftarrow \text{num}(x) \\
 (3) \quad & \text{odd}(s(x)) \leftarrow \neg \text{odd}(x), \text{num}(x)
 \end{aligned}$$

- a) Using the “leftmost” selection rule, show the sequence of pre- SLDNF -trees which leads to a successful SLDNF -tree for

$$P \cup \{\neg \text{odd}(s(s(0)))\}.$$

- b) Show two successful SLDNF -derivations with different CAS's for

$$P \cup \{\text{odd}(x)\}.$$

- c) Is P allowed? Is the query $\neg \text{odd}(s(s(0)))$ allowed? Is the query $\text{odd}(x)$ allowed? Give a query such that $P \cup \{Q\}$ flounders.
- d) Construct the dependency graph D_P of P . Is P strict with respect to any query Q ? Is P stratified?
- e) Show that $\text{odd}(s(0))$ is not a semantic consequence of P .

Exercise 7.3

Compute $comp(P)$ for the following program P :

$$\begin{aligned} member(x, [x|xs]) &\leftarrow \\ member(x, [y|xs]) &\leftarrow member(x, xs) \\ is_set([]) &\leftarrow \\ is_set([x|y]) &\leftarrow \neg member(x, y), is_set(y) \end{aligned}$$

Exercise 7.4

Consider the following program P :

$$\begin{aligned} p(x) &\leftarrow q(x), \neg p(b) \\ p(b) &\leftarrow \neg q(b) \\ q(a) &\leftarrow \end{aligned}$$

Give all Herbrand interpretations $I \subseteq HB_{\{p,q\},\{a,b\}}$ that are a model for P .