Test 3

Answer Set Solving in Practice

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You have 15 minutes to do the test, and you can get 2 bonus points.

All **non-electronic** (and non-alive) support materials can be used.

First Name: **Last Name:**

Points: (1) ..... (2) ..... (3) ..... **Total:**

Warning: All pages should have the personal data.

Exercise 3.1 (5 Points)

Find all the unfounded sets of the following normal program P with respect to the partial interpretation $\langle\{a\},\{d\}\rangle$:

$$P = \left\{ \begin{array}{l} c \leftarrow b, \sim a \\ c \leftarrow a \\ b \leftarrow a \\ a \leftarrow \sim c, b \\ d \leftarrow \sim c, \sim b \\ d \leftarrow \sim b, a \end{array} \right\}$$

First Name: **Last Name:**

Exercise 3.2 (5 Points)

Find the Fitting Semantics and the Wellfounded Semantics of the following normal logic program P:

$$P = \left\{ \begin{array}{lll} a \leftarrow \sim g, b & b \leftarrow a, \sim d & b \leftarrow a, e \\ c \leftarrow \sim a, \sim g & d \leftarrow c, \sim f & e \leftarrow a, b \\ e \leftarrow & f \leftarrow e, \sim g & f \leftarrow a, \sim f \end{array} \right\}$$

Exercise 3.3 (5 Points)

Let P be the following normal logic program:

$$P = \left\{ \begin{array}{lll} a \leftarrow c & b \leftarrow c, a & c \leftarrow b, \sim d \\ a \leftarrow \sim d & b \leftarrow \sim e & c \leftarrow b, f \\ d \leftarrow \sim e, b & e \leftarrow f, \sim d & f \leftarrow a \end{array} \right\}$$

3.3–a Find all models of $CF(P)$.

3.3–b Write the loop formulas in $LF(P)$.

3.3–c Find all the stable models of P.

Solution 3.1

$U_1 = \emptyset \qquad U_2 = \{a, b\} \qquad U_3 = \{a, b, c\}$

Solution 3.2

3.2–a $\langle \{e, f\}, \{d, g\} \rangle$

3.2–b $\langle \{c, e, f\}, \{a, b, d, g\} \rangle$

Solution 3.3

3.3–a $X_1 = \{a, e, f\} \qquad X_2 = \{b, d\} \qquad X_3 = \{a, b, c, d, f\} \qquad X_4 = \{a, b, c, e, f\}$

3.3–b $$LF(P) = \left\{ \begin{array}{c} a \vee b \vee c \rightarrow \neg d \vee \neg e \\ a \vee c \vee f \rightarrow \neg d \vee (b \wedge \neg d) \\ b \vee c \rightarrow \neg e \\ a \vee b \vee c \vee f \rightarrow \neg d \vee \neg e \end{array} \right\}$$

3.3–c $X_1 = \{a, e, f\} \qquad X_2 = \{b, d\}$