Some Incomplete Constraint Solvers
Pages: 178 – 196
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1.
a) *Equality and Disequality Constraints*

Apply the rules of *EQU* proof system to the following CSP as many times as possible:

$$\langle x_1 \neq x_3, x_1 = x_6, x_4 = x_4, x_3 \neq x_6, x_5 \neq x_4, x_5 \neq x_7; x_1 \in \{a,b,c,d\}, x_2 = n, \\ x_3 = d, x_4 \in \{e,r\}, x_5 = e, x_6 \in \{a,r,s\}, x_7 \in \{e,s\}\rangle$$

b) *Inequality Constraints on Integer Intervals*

Apply *LINEREAR INEQUALITY 1* rule once to the following CSP:

$$\langle x_1 + 2x_2 - 3x_3 \leq 4; x_1 \in [1..10], x_2 \in [2..20], x_3 \in [-10..10]\rangle$$

2.
a) *Boolean Constraints*

Transform the following Boolean constraints to *simple* form:

(i) $x_1 \wedge (x_2 \vee x_3) = x_4$

(ii) $\neg(x_1 \wedge (x_2 \wedge x_3)) = x_4$

(iii) $(x_1 \vee (x_2 \wedge x_3)) \vee x_4 = x_5$

b) *Boolean Constraints*

Apply at least two rules from the proof system *BOOL* to the following CSP:

$$\langle (x_1 \wedge x_2) \vee (x_2 \wedge x_3) = x_4, \neg x_1 \wedge (x_5 \vee x_6) = x_7 \wedge (x_2 \wedge x_3); \\ x_1 \in \{0,1\}, x_2 = 1, x_3 = 1, x_4 \in \{0,1\}, x_5 = 1, x_6 \in \{0,1\}, x_7 = 1\rangle$$