Constraint Satisfaction Problems

B. Nebel, S. Wölfl, J. Hué M. Westphal Sommersemester 2012 University of Freiburg Department of Computer Science

Exercise Sheet 3 Due: 21.05.2012 (Note: Submissions now on Mondays)

Exercise 3.1 (2 Points)

Given the following constraint network:

$$N = \left\langle (v_1, v_2, v_3), (\{2, 3\}, \{1, 2, 3, 4\}, \{1, 3, 4\}), \{\leq_{(v_1, v_2)}, \neq_{(v_1, v_3)}, =_{(v_2, v_3)} \} \right\rangle$$

Find the minimal network N_0 for N.

Exercise 3.2 (1+1+1 Points)



TOLL, EAT, ATOLL, HEAT

- (a) Formalize this crossword puzzle as a *constraint network*.
- (b) Draw the *primal constraint graph* of your formalization.
- (c) Draw the *dual constraint graph* of your formalization.

Exercise 3.3 (2+2+1 Points)

Give an example and prove that your example has the required property for each of the following types of relations:

- (a) a binary decomposable relation of arity n,
- (b) a binary representable relation that is not binary decomposable,
- (c) a relation that is not binary representable.