

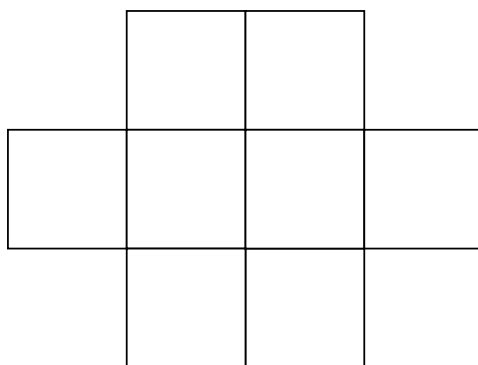
ICS 171
Fall 2006
Prof. R. Dechter
Homework Assignment 3
Due Tuesday 10/24

1. Exercise 5.2 in Russel and Norvig, page 158
2. Exercise 5.3 in Russel and Norvig, page 158
3. Exercise 5.5 in Russel and Norvig, page 159
4. Consider the following binary constraint network: There are 4 variables: X_1, X_2, X_3, X_4 , with the domains:

$$D_1 = \{1, 2, 3, 4\}, D_2 = \{3, 4, 5, 8, 9\}, D_3 = \{2, 3, 5, 6, 7, 9\}, D_4 = \{3, 5, 7, 8, 9\}.$$

The constraints are: $X_1 \geq X_2$, $X_2 > X_3$ or $X_3 - X_2 = 2$, $X_3 \neq X_4$.

- (a) Write the constraints in a relational form and draw the constraint graph.
 - (b) Is the network arc-consistent ? if not, compute the arc-consistent network.
 - (c) Is the network consistent ? If yes, give a solution.
5. Consider the 8 squares positioned as follows:



The task is to label the boxes above with the numbers 1-8 such that the labels of any pair of adjacent squares (i.e. horizontal vertical or diagonal) differ by at least 2 (i.e. 2 or more).

- (a) Write the constraints in a relational form and draw the constraint graph.
 - (b) Is the network arc-consistent ? if not, compute the arc-consistent network.
 - (c) Is the network consistent ? If yes, give a solution.
6. (Problem 5.6 in Russel and Norvig, page 159) Solve the cryptarithmic problem in Figure 5.2 by hand, using backtracking with Forward checking and with MRV and with least constraining value heuristics.