Foundations of Constraint Programming
Tutorial 5 (on January th)

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Exercise 5.1:
Consider the following CSP P:

$$\langle x < y; x \in [7..15], y \in [9..12] \rangle$$

Show in detail how to apply Corollary 1 (slide 33, lecture 4) to prove that P is consistent.

Exercise 5.2:
The following boolean constraints define a digital circuit:

$$y_1 = x_1 \oplus x_2, y_2 = x_2 \oplus x_3, y_3 = x_3 \oplus x_4, y_4 = x_4$$

The following CSPs are instances of the given circuit, where

$$\langle y_1 = x_1 \oplus x_2, y_2 = x_2 \oplus x_3, y_3 = x_3 \oplus x_4, y_4 = x_4; x_1 = 1, x_2 = 0, x_3 = 0, x_4 = 1 \rangle$$
$$\langle y_1 = x_1 \oplus x_2, y_2 = x_2 \oplus x_3, y_3 = x_3 \oplus x_4, y_4 = x_4; x_2 = 1, y_1 = 1, y_3 = 1, y_4 = 1 \rangle$$

a) Draw the digital circuit, where inputs are x_1, x_2, x_3 and x_4 and outputs are y_1, y_2, y_3 and y_4.

b) Show how to compute a successful derivation for the given instances yielding the values for all eight variables; at each step underline the selected constraint and give the used rule.

Hint: Use the XOR rules on slide 11 (lecture 5) or define alternative rules.