MPRI 2012/2013
December 18, 2012
Instructor: Manuel Bodirsky

Constraint Satisfaction: Algorithms and Complexity

Delivery date: 08/01/2013

Series 2

Problem 1

Prove that for a relational structure Γ the following is equivalent:

- Every relation R in Γ is *2-decomposable*, that is, R contains all n-tuples $(t_1, \ldots, t_n)$ such that for all $i, j \in \{1, \ldots, n\}$ there is a tuple $s \in R$ such that $t_i = s_i$ and $t_j = s_j$.
- Every relation that is primitive positive definable in Γ is definable by a conjunction of binary primitive positive definable relations in Γ.

Problem 2

For a tree T with a distinguished vertex $v \in V(T)$, consider the structure $(V(T); <, E)$ where

- E is the binary relation that contains all pairs (x, y) such that the distance between x and v is strictly smaller than the distance between y and v, and
- $<$ is a linear extension of E.

Find such a tree T so that the corresponding structure $(V(T); <, E)$ can *not* be solved by arc consistency.