T-79.194 Seminar on Theoretical Computer Science, Spring 2004
Home Assignment (Emilia Oikarinen)

1. Consider CSP $\mathcal{P}$:

$$\begin{aligned}\mathcal{P} \;=\; & \langle x_1 < x_2, x_2 \neq x_3, x_3 = x_4, x_3 < x_5, x_4 + x_5 = 2, \\ & x_6 < x_4, x_1 - x_6 = 0, x_1 \neq x_7, x_7 < x_8, x_6 \leq x_8; \\ & x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 \in [0..10]\rangle\end{aligned}$$

   (a) (0.5 points) Draw a constraint graph G of $\mathcal{P}$.

   (b) (0.5 points) Triangulate G.

   (c) (1.0 points) Find a tree-decomposition of the triangulated graph obtained in (b).

2. (a) (1.0 points) Let $X = \{a, b, c, d, e\}$, $a \preceq b \preceq c \preceq d \preceq e$ and $\mathcal{C}_1 = \{a, b\}$, $\mathcal{C}_2 = \{b, e\}$, $\mathcal{C}_3 = \{c, d\}$.

   Is $\preceq$ compatible enumeration order of X? Justify your answer. If not, present a compatible enumeration order for X.

   (b) (1.0 points) Prove the "Jump by the goods" property, i.e. for all $\mathrm{g}(\mathcal{C}_i/\mathcal{C}_j)$ every consistent instantiation $\mathcal{A}$ of Y such that $\mathcal{A}[\mathcal{C}_i \cap \mathcal{C}_j] = \mathrm{g}(\mathcal{C}_i/\mathcal{C}_j)$ has a consistent extension on $\mathrm{Desc}(\mathcal{C}_j)$.