Huiswerk 1

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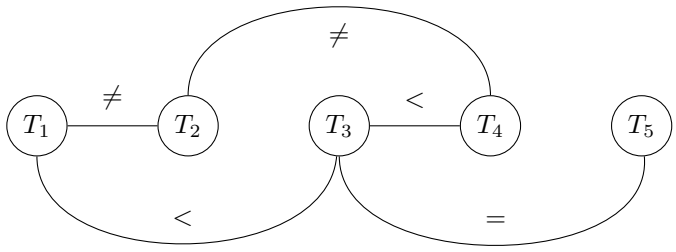
1 Question 1

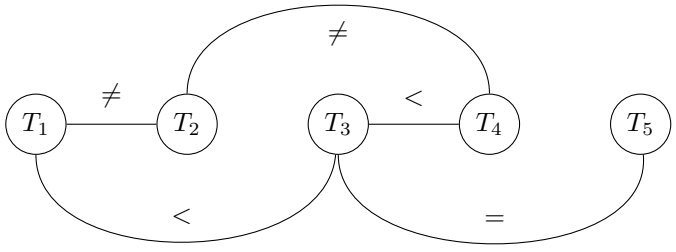
a) $V = \{X_1, X_2..., X_n\}$, $D = \{D_1, D_2, ..., D_n\}$ where $D_1 = D_2 = ... = D_n = \{13.00, 14.00, 15.00\}$ and $C = \{T_1 < T_3, T_3 < T_4, T_3 = T_5, T_2 \neq T_1, T_2 \neq T_4, T_4 \neq 14.00\}$

b) Constraint Graph (unary constraint $T_4 \neq 14.00$ is reflected in omission of 14.00 in D_4)



$\{13, 14, 15\}$ $\{13, 14, 15\}$ $\{13, 14, 15\}$ $\{13, 15\}$ $\{13, 14, 15\}$

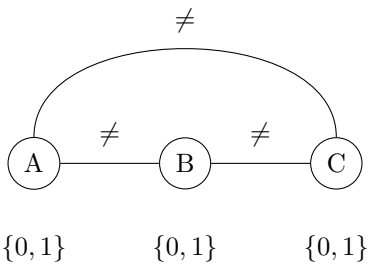
c) Arc-consistent Graph after constraint propogation



$\{13\}$ $\{14\}$ $\{14\}$ $\{15\}$ $\{14\}$

d) A solution to the CSP is $T_1 = 13, T_2 = 14, T_3 = 14, T_4 = 15, T_5 = 14$

e) It is not true that for very element x in the domain of a varaible v after propogation that there exists a solution where $v = x$. The propogation algorithm ensures that every pair of nodes are arc-consistent both ways (local consistency if nodes are also consistent). However, local consistency does not guarantee global consistency. For example, a variable might have $D = \{a, b\}$ but setting the variable to a could constraint another variable such that the variable no longer has any possible assignments. An example of this:



After peforming AC3 constraint propogation, the constraint graph remains the same. The domains on the variables contain values 1 and 2 but there is no solution to the problem at all.