T-79.194 Homework
Searh trees, pages 332-347
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1. Consider the following instance of the Knapsack problem. The set of objects is as follows: The first object weighs 200 grams and its value is 50 euros, the second object weighs 300 grams and its value is 25 euros and the third object weighs 500 grams and its value is 40 euros. The size of the knapsack is 800 grams. This is formulated as the following CSP:

$$\langle 200 \cdot x_1 + 300 \cdot x_2 + 500 \cdot x_3 \leq 800; x_1 \in \{0, 1\}, x_2 \in \{0, 1\}, x_3 \in \{0, 1\}\rangle$$

In addition we want to maximize the function:

$$obj(x_1, x_2, x_3) = 50 \cdot x_1 + 25 \cdot x_2 + 40 \cdot x_3$$

You also have the heuristic function:

$$h(D_1, D_2, D_3) = 50 \cdot \max(D_1) + 25 \cdot \max(D_2) + 40 \cdot \max(D_3)$$

where the function max returns the largest value of the given domain.

Assume that the order of variables is x_1, x_2, x_3 and that the largest value is always selected first from the domain. Simulate the branch and bound algorithm with no constraint propagation for this CSP.

2. Consider the following CSP:

$$\langle x > y, y > z; x \in \{2, 3\}, y \in \{1, 2, 3\}, z \in \{1\}\rangle$$

Simulate the backtracking algorithm. Use forward checking as constraint propagation. Do three runs of simulation. First instantiate the variables in the order x, y, z. Then choose the instantiated variable to be the one with the smallest domain. Finally choose the instantiated variable to be the most constrained one.