Foundations of Artificial Intelligence

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Exercise Sheet 8

Due: April 22, 2020

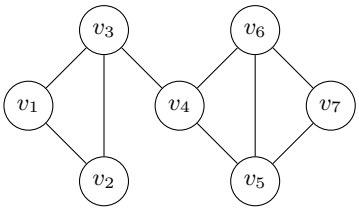
Important: For submission, consult the rules at the end of the exercise. Non-adherence to the rules will lead to your submission not being corrected.

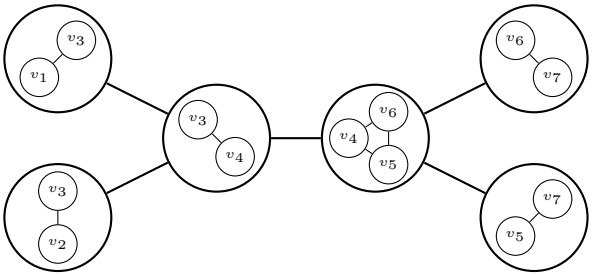
Exercise 8.1 (3 marks)

Let $\mathcal{C}$ be a solvable constraint network with acyclic constraint graph. Show that the application of the algorithm for trees as constraint graphs (slide 12 of chapter 27 of the print version of the lecture slides) leads to a solution for $\mathcal{C}$ and that the algorithm does never change the values of assigned variables during application (i.e., the domain of each variable is always non-empty and the partial assignments that are considered are always consistent).

Exercise 8.2 (0.5 marks)

Given the constraint graph depicted below on the left side, name the *two* reasons why the graph depicted on the right side is not one of its valid tree decompositions.



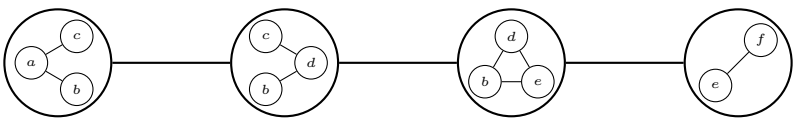


Exercise 8.3 (2.5 marks)

Consider the constraint network $\mathcal{C} = \langle V, \mathrm{dom}, (R_{ab}) \rangle$ with $V = \{a, b, c, d, e, f\}$, $dom_x = \{0, 1, 2, 3\}$ for all $x \in V$ and the following constraints:

$a = c - 1$	$a < b$	$c = d$	$b > d$
$d < e$	$b = e$	$e < f$	

Solve $\mathcal{C}$ with the following tree decomposition and the instructions from slide 15 of the print version of chapter 28.



Submission rules:

- Upload a single PDF file (ending .pdf). If you want to submit handwritten parts, include their scans in the single PDF. Put the names of all group members on top of the first page. Use page numbers or put your names on each page. Make sure your PDF has size A4 (fits the page size if printed on A4).
- Only upload one submission per group. Do not upload several versions, i.e., if you need to resubmit, use the same file name again so that the previous submission is overwritten.