CC484 - Constraint Satisfaction Problem

by

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Exercises

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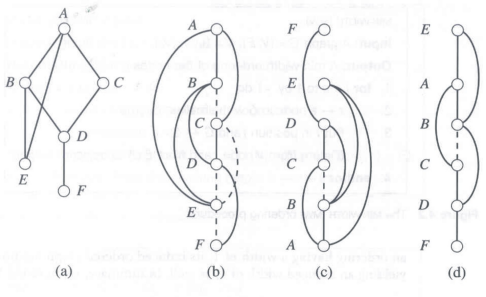

Figure 1: (a) Graph G, and three orderings of the graph: (b) $d_1 = (F, E, D, C, B, A)$, (c) $d_2 = (A, B, C, D, E, F$, and (d) $d_3 = (F, D, C, B, A, E)$. Broken lines indicate edges added in the induced graph of each ordering.

Exercises

1. Given Figure 1, define the following:
   (a) Parents of A along d_1
   (b) Width of A along d_1
   (c) Width of C along d_1
   (d) $w(d_1)$, $w(d_2)$, $w(d_3)$
2. Assume that the constraints and the domains of the problem in Figure 2 are specified as follows: $D_1 = \{red, white, black\}$, $D_2 = \{green, white, black\}$, $D_3 = \{red, white, blue\}$, $D_4 = \{white, blue, black\}$, $R_{12} : x1 = x2$, $R_{13} : x_1 = x_3$, $R_{34} : x_3 = x_4\}$. Using the ordering $d = (x_1, x_2, x_3, x_4)$, Compute:
   (a) D_1
   (b) D_2
   (c) D_3
   (d) D_4

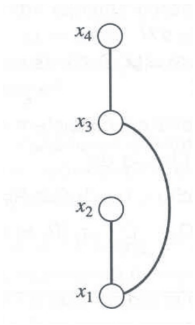

Figure 2: An ordered constraint graph.

Answers

1. (a) $\{B, C, E\}$
   (b) 3
   (c) 1
   (d) 2
   (e) $w(d_1) = 3$, $w(d_2) = 2$, $w(d_3) = 2$
2. (a) $D_1 = \{white\}$
   (b) $D_2 = \{green, white, black\}$
   (c) $D_3 = \{white, blue\}$
   (d) $D_4 = \{white, blue, black\}$