16.410-13 Recitation 3 Problems

Problem 1: Soundness of Arc Consistency Algorithms

Prove that AC-1 algorithm is sound, i.e., the solution returned by the algorithm is indeed an arc consistent network.

Problem 2: Modeling using Constraints

Crossword puzzles can be modeled as constraint satisfaction problems. The task is to assign words from the dictionary into vertical and horizontal slots according to certain constraints. The dictionary is given as follows.

$$\{HOSES, LASER, SHEET, SNAIL, STEER, ALSO, EARN, HIKE,$$
$$IRON, SAME, EAT, LET, RUN, SUN, TEN, YES, BE, IT, NO, US\}$$

The crossword puzzle is provided in the figure below. First, consider a formulation in which each blank

square is a variable. Write down the domains and the constraints. Second, consider a formulation where each starting point for a word (either vertical or horizontal) is a variable. Write the domains and the constraints.

Problem 3: Arc consistency

Consider the network given in the figure below. Each node labeled via A, B, C, D, E, F, G, and H take values in $\{1, 2, 3, 4\}$. Find an equivalent arc consistent network (practice using the AC-1 and AC-3 algorithms).
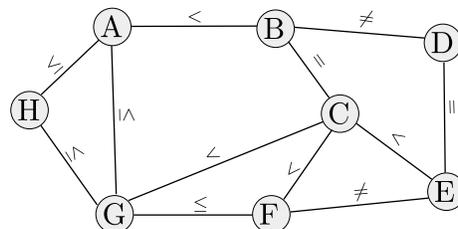
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