

Problem 5 – CSP (12 points)

Assume we have four variables (A, B, C, D) and two values (1, 2). We write variable/value assignments as A1, B2, etc. Assume the only legal values are as listed below:

- A-B: A1-B1, A2-B1, A2-B2
- A-C: A1-C2, A2-C1
- A-D: A2-D2
- B-C: B1-C2, B2-C1
- B-D: B2-D2
- C-D: C1-D1, C1-D2

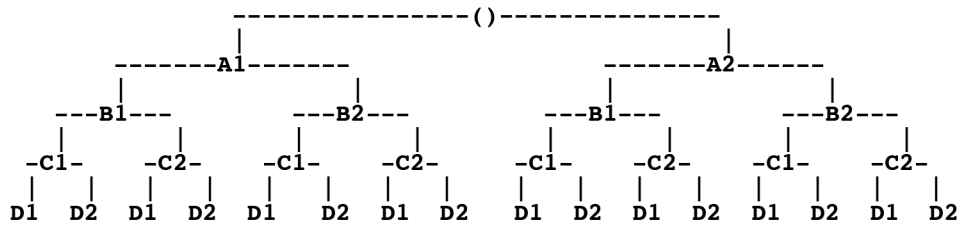
An entry in the matrix below indicates a consistent assignment. This is simply another way of presenting the same information in the list above.

	A1	A2	B1	B2	C1	C2	D1	D2
A1			X			X		
A2			X	X	X			X
B1	X	X				X		
B2		X			X			X
C1		X		X			X	X
C2	X		X					
D1					X			
D2		X		X	X			

Assume you do full constraint propagation in this problem. Show the legal values for each variable after propagation:

- A: A2
- B: B2
- C: C1
- D: D2

Here's the search tree (as in the PS):



Assume that you do the backtracking with forward checking. Show the assignments in order as they are generated during the search.

- A1 (FC reduces domain of D to empty, so fail)
- A2 (FC reduces domain of C to C1 and domain of D to D2)
- B1 (FC reduces domain of D to empty, so fail)
- B2 (FC has no further effect)
- C1 (FC has no further effect)
- D2 (done)

What is the first solution found in the search?

A=2, B=2, C=1, D=2

 The constraints – repeated for easy reference:

- A-B: A1-B1, A2-B1, A2-B2
- A-C: A1-C2, A2-C1
- A-D: A2-D2
- B-C: B1-C2, B2-C1
- B-D: B2-D2
- C-D: C1-D1, C1-D2

	A1	A2	B1	B2	C1	C2	D1	D2
A1			X			X		
A2			X	X	X			X
B1	X	X				X		
B2		X			X			X
C1		X		X			X	X
C2	X		X					
D1					X			
D2		X		X	X			