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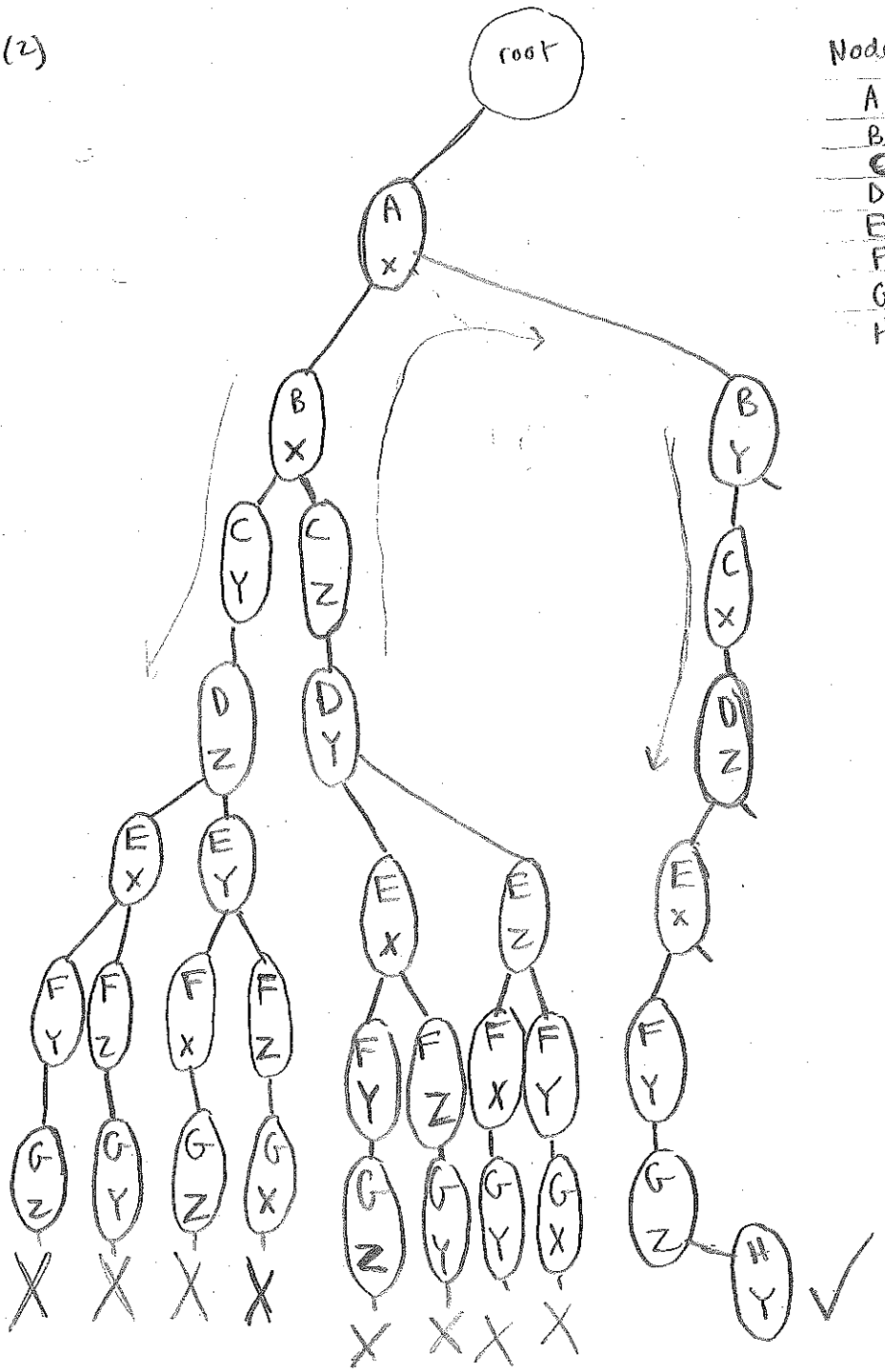
CIS521 – HW 4
written portion

1.1 AC-3 and CSPs

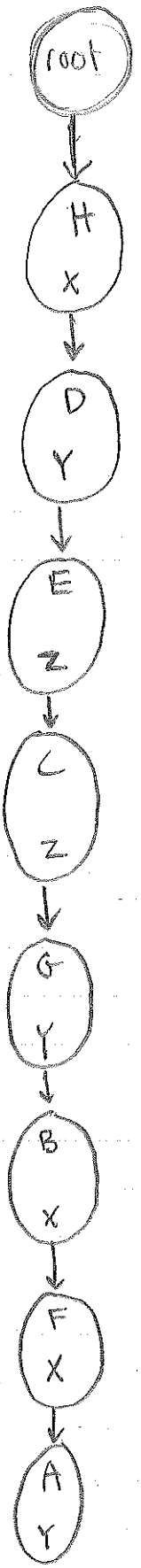
(1) Variables: A, B, C, D, E, F, G, H
Constraints: No two adjacent rooms can be the same color
Domains: $D_i = \{X, Y, Z\}$

(2)



Node	Depth dependencies
A	
B	
C	B
D	B, C
E	D
F	E
G	E, F
H	A, C, D, E, G

(3)



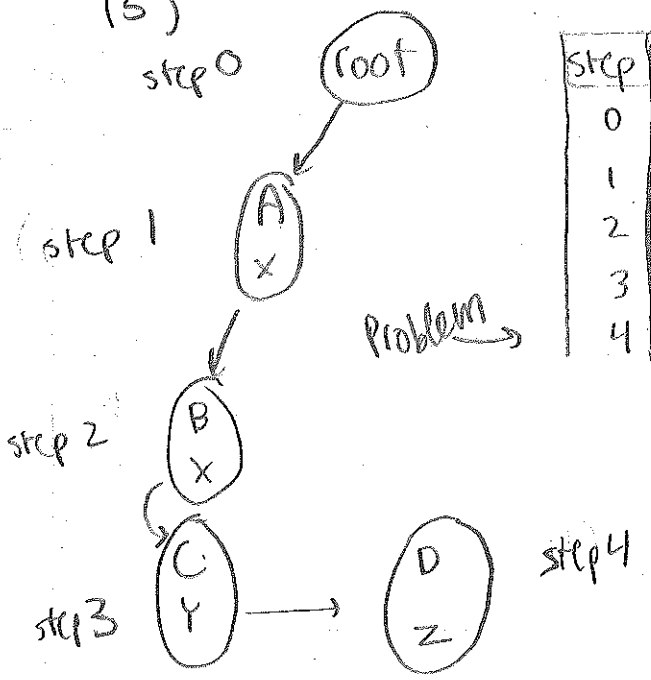
Node	Constraints	Num
A	H	1
B	C, D	2
C	B, D, H	3
D	B, C, E, H	4
E	D, F, G, H	4
F	E, G	2
G	E, F, H	3
H	A, C, D, E, G	5

(4)

Same tree

because we are restricted to one value for each variable except H, D, A. For those, choosing a value is arbitrary, so it wouldn't affect other variables' constrains on values.

(5)



step	A	B	C	D	E	F	G	H
0	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ
1	(X)	XYZ	XYZ	XYZ	XYZ	XYZ	XYZ	YZ
2		(X)	YZ	YZ	XYZ	XYZ	XYZ	YZ
3			(Y)	Z	XYZ	XYZ	XYZ	Z
4				(Z)	XY	XYZ	XYZ	(–)

Problem →

H has no more possible values.

(6) Running AC-3 on this problem will do nothing. You will check each arc, and since all variables have full domains, you will never end up deleting any values from the domains. No arcs will be re-added to the queue, so eventually the queue will be empty and we'll exit.

(7) Besides $D_A = \{Y\}$ and $D_B = \{X\}$ from the prompt, after running AC-3, we get $D_C = \{YZ\}$, $D_D = \{YZ\}$ and $D_H = \{XZ\}$. Arcs (HA), (CB) and (DB) were added back to the queue in that order.