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COMP 424

Homework 2

Question 1

a) Variables: *K1, K2, Q1, Q2*
Domain (same for all variables): Di={1, 2, 3, 4} (rows of the 4x4 chess board)
Constraints:

- rows 1 and 2 must each contain a knight, and rows 3 and 4 must each contain a queen
- no two pieces attack each other:
  - The **Knight** piece can **move** forward, backward, left or right two squares and must then **move** one square in either perpendicular direction. The **Knight** piece can only **move** to one of up to eight positions on the board.

$$(1)\ |K_1 - K_2| \neq 2$$
$$(2)\ |K_2 - Q_3| \neq 1$$
$$(3)\ |K_1 - Q_3| \neq 1$$
$$(4)\ |K_2 - Q_4| \neq 1$$

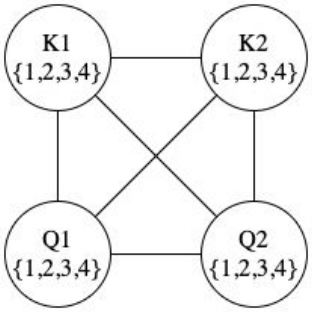
  - **Queen** can be moved any number of unoccupied squares in a straight line
    - No knight can be in the same column as a Queen:

$$(6)\ K_i \neq Q_j$$
$$(7)\ Q_3 \neq Q_4$$

    - No knight can be in diagonal to the Queen:

$$(8)\ |K_i - Q_j| \neq |i - j|$$
$$(9)\ |Q_3 - Q_4| \neq |i - j|$$

Constraint graph



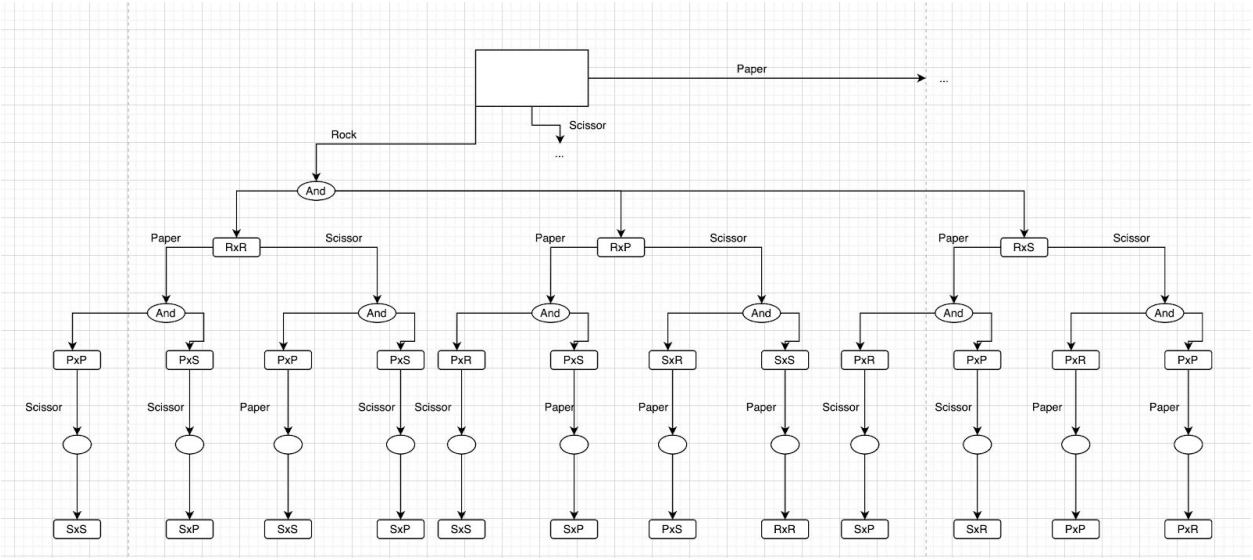
b) $\{(K_1, K_2), (K_2,K_1), (K_1,Q_1), (Q_1,K_1),$

$(K_2,Q_2), (Q_2,K_2), (K_1,Q_2), (Q_2,K_1),$

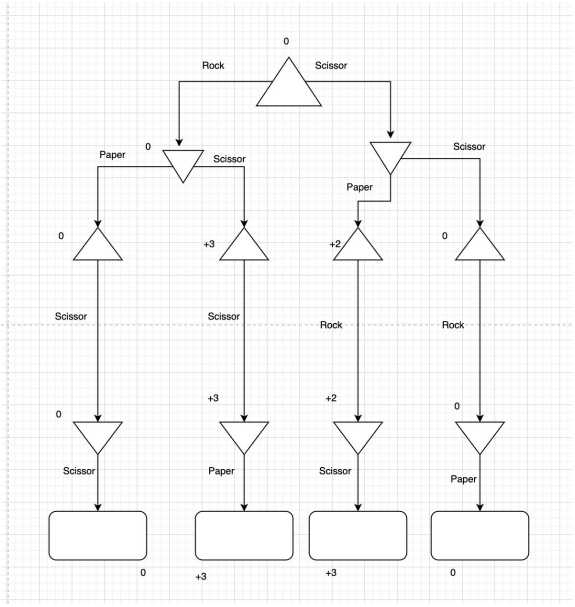
$(Q_1,Q_2), (Q_2,Q_1), (K_2,Q_1), (Q_1,K_2)\}$

Question 2

a)



b)



No, You can't guarantee a win you can guarantee not losing

By observing the min - max graph , we can see that there will be guaranteed at least a draw.

3)

i) 5 (5 truths) ii) 0 (all contradiction) iii) 2^5 (2^5 models)

i) Valid

A	B	C	Output
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

ii)Valid

A	B	C	Output
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Both propositions result in tautology (all true)