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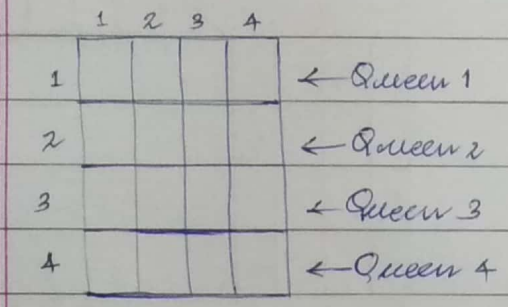
Q. Write N Queens problem and draw its state space tree.

N-Queens problem is to place n queens on an n-by-n chessboard so that no 2 queens attack each other by being in the same row or in the same ~~problem~~ column or on the same diagonal.

N=4 :



To avoid row attacks place the 4 queens on different rows as shown in figure.

I. Start with an empty board and place 'Queen 1' in row = 1 & column = 1
Place 'Queen 2' in its first acceptable position ie row = 2 & column = 3

This proves to be a dead end since "Queen 3" doesn't have an acceptable position.

II. Backtrack ⇒ put "Queen 2" in next position ie (2,4).
∴ Place "Queen 3" at (3,3) ⇒ reaches dead end.

III. Backtrack ⇒ no more next position for "Queen 2" ⇒ backtrack all the way upto "Queen 1". ∴ "Queen 1" moves to (1,2)
⇒ "Queen 2" moves to (2,4)
"Queen 3" moves to (3,1)
"Queen 4" moves to (4,3)
Thus, it's one solution to the problem.

State space tree :