

* 12/01/2022

AI - Lab (Expt 1) Board).

(1.) 8 queen problem:- (Backtracking)

* Theory:- You are given a 8×8 chessboard, find a way to place 8 queens such that no queen can attack any other queen on the chessboard. A queen can only be attacked if it lies on the same row, or same column, or same diagonal of any other queen.

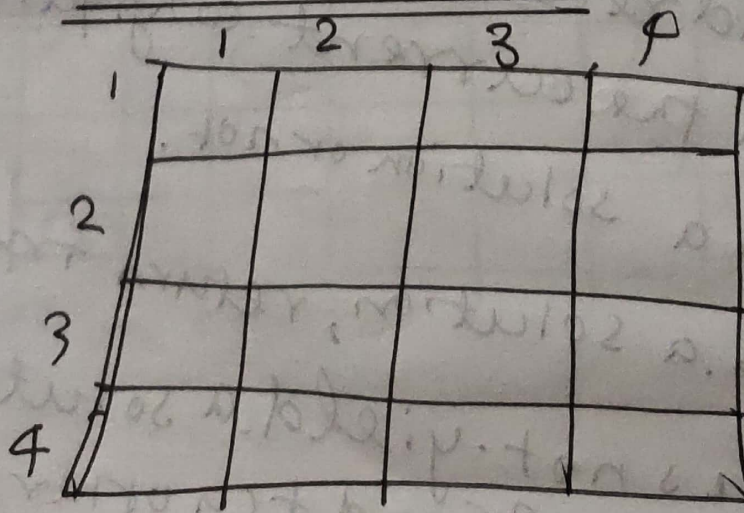
Problem Formulation:-

* Operators:- The queen can move in the same column, row or diagonal so it is not attacked in the board by other queen.

* States:- Arrangement of 0 to 8 queens on board.

* Path Cost:- 0 (Only concerned with final state).

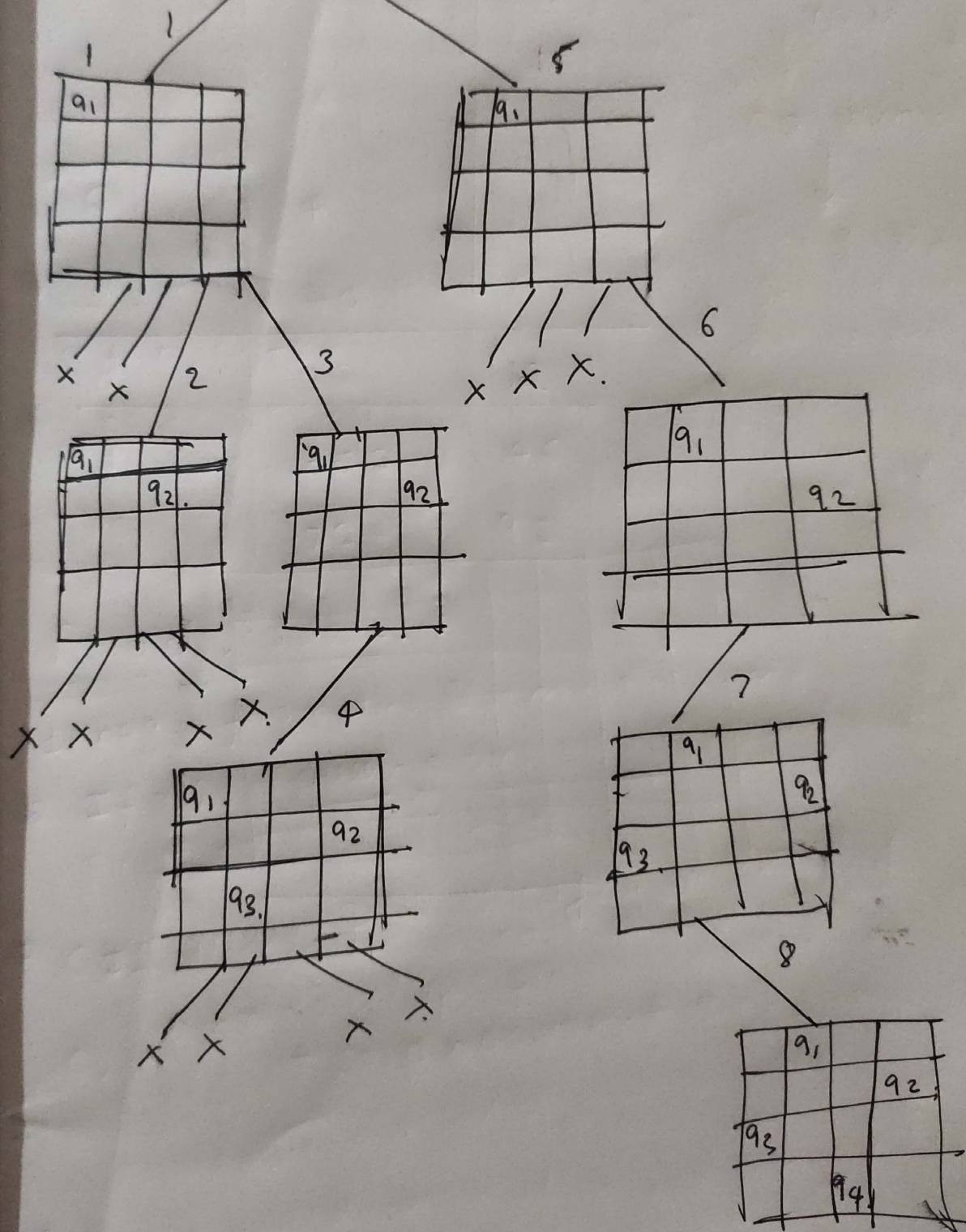
Solution:-



(4 * 4
chess
board)

	1	2	0	3	4
1			q_1		
2	q_2				
3				q_3	
4		q_4			

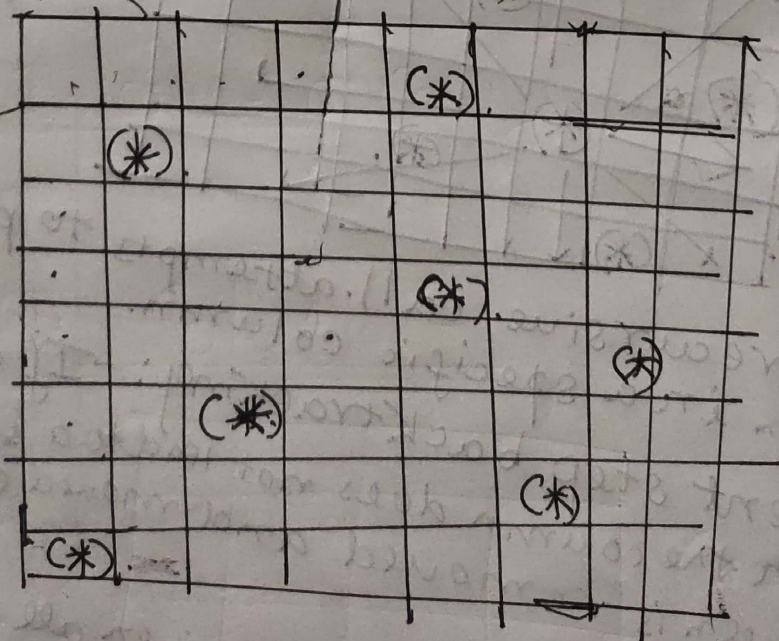
(State Space)



Algorithm:-

1. Place the ~~recursion~~ first queen in the upper corner of the table.
2. Save the attacked positions.
3. Move to the next queen. (which can only be placed to the next line).
4. Search for a valid position. If there is one go to step 8.
5. There is no a valid position for the queen. Delete it. (the x coordinate is 0).
6. Move to the previous queen.
7. Go to step 4.
8. Place it to the first valid position.
9. Save the attacked positions.
10. If the queen processed is the last stop. Otherwise go to step 3.

Goal State:-



Pseudocode:-

1. begin from the leftmost column.
2. If all the queens are placed, return true / print configuration.
3. If queen placed safely, mark row & column; and recursively check if we approach in the current configuration, do we obtain a solution or not.
4. If it yields a solution, return true.
5. If placing does not yield a solution, unmark and try other rows.

Result:- The problem of 8 queens problem was solved successfully