Assignment - A4 41403

- Title: N-Queens problem
- Problem statement: Implement n-queens problem (branch & bound)
- Objective: - Students will learn to implement n-queens problem.
  - Understand backtracking algorithm.
- Outcomes: Students will understand how to utilise backtracking.
- S/W & H/W: python 3, 64 bit OS.
- Theory:

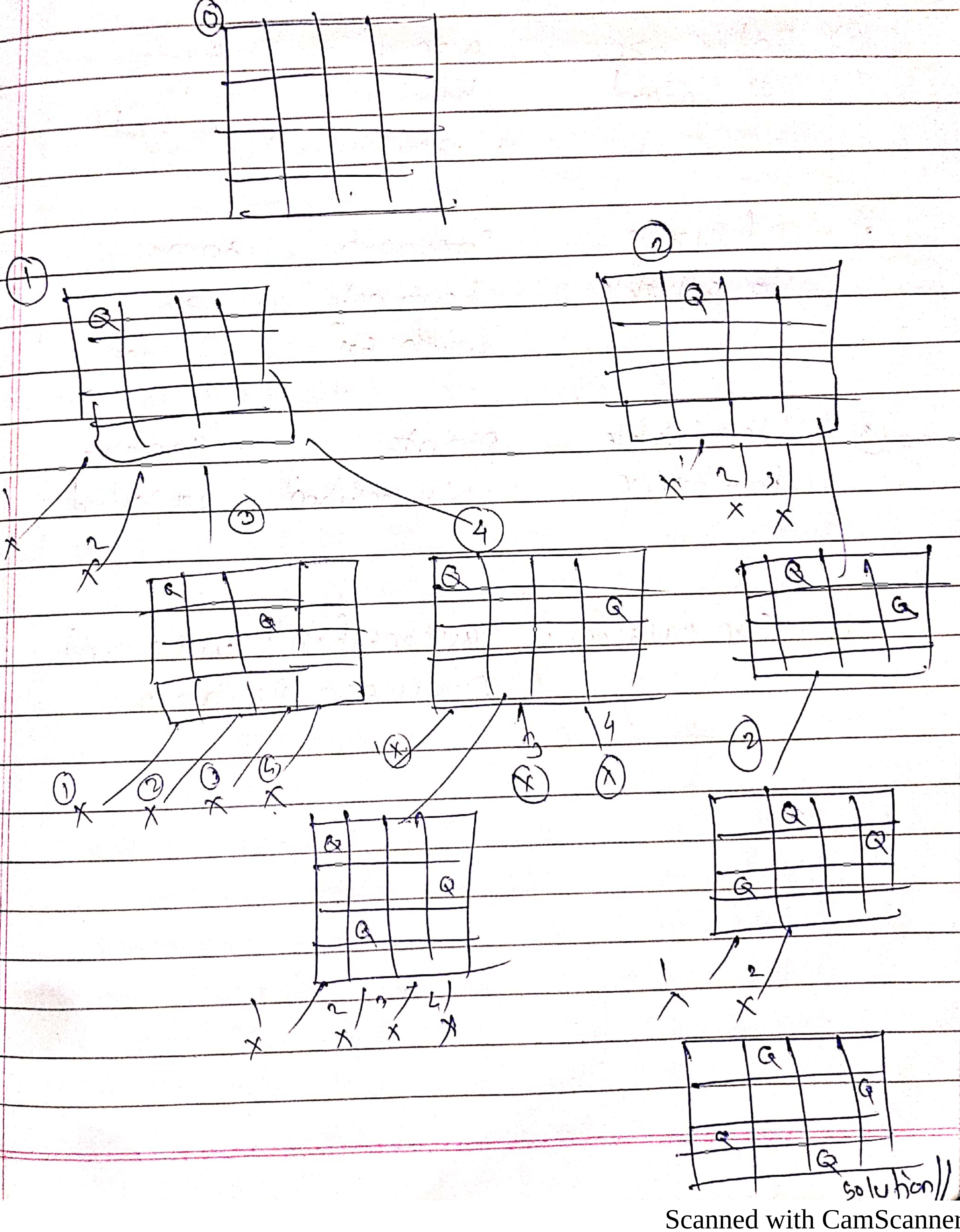
Backtracking: It is a general algorithm for finding all some computational problems, notably, constraints satisfaction problem that incrementally builds candidates to the solution.

- It can only be applied for problems which admit the concept of a "partial candidate" solution & as relatively quick test of whether it can possibly be completed to a valid solution.
- It is convenient to implement this kind of processing by constructing a tree of choices being node, called the state space tree.

- It is called non-promising leaves represent other non promising dead ends or complete solutions found by the algorithm

- N-Queens problems:
- The problem is to place n queens on a nxn chessboard so that no two queens attack each other by being in the same row or in the same column or on the same diagonal!
- for n=1, the problem has a trivial solution.
- for n=2 & n=3 there is no solution.
- let us consider 4-queens problem & solve it by using backtracking
- Since each of the 4 queens has to be placed in its own rows. all we need to do is assign a column for each queen.
- we start with empty board place queen 1.
- Then we place queen 2 after trying unsuccessfully columns 1 & 2 in the first acceptable position for queen 2.
- So the algorithm backtracking & puts queen 2 in the next possible position at (2,4)
- Then queen 3 is placed at (3,2) which proves to be another dead end.
- The algorithm backtracking all the way to queen 1 & moves it (1,2)

∴ Queen 2 goes to (2,4), queen 3 to (3,1) & queen 4 to (4,3) which is the solution to the problem.



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- Test case

	Description	Expected	Actual	Result
①	Enter size of board	size of board is input	same as expected	success
②	If puzzle is solvable	Program terminate with soln	same as expected	success
③	Unsolvable instance	prints 'No solution'	same as expected	success

- Conclusion: successfully implement n-queens problem