

# AI Final Project Proposal (N-Queens)

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<b>Summary</b>	A brief summary of the N-Queens game, our approach to solving it, and our method for evaluating the results.
<b>What is N-Queens</b>	The N-Queens puzzle involves the placement of N chess queens on a N-by-N chessboard, in such a way that no queens threaten each other with a move. Queens can move up or down, left or right, or in any 4 diagonals on a given move. All these move can go as far as the board allows.
<b>Approach</b>	<p>Our approach is to think about the N-Queens puzzle as a Constraint Satisfaction Problem (CSP). Doing so, will allow us to develop a backtracking search algorithm to solve the puzzle with a simple 2D array as the data structure.</p> <p>The general idea of the backtracking search algorithm would be to place queens starting in the left-most column and move right. This way we only need to check both left diagonals, and directly left in the row. There will be no need to check the right side as no queens will be placed yet and conflicts can't be predicted. In each column it will search by each row until it finds a solution spot for that column. If a solution spot is found we will continue to the next column. If no solution is found we will backtrack to the previous row by returning false and continue searching for the next solution spot in that column. Once there are no more columns to navigate, we will know the puzzle is solved.</p>
<b>Constraints</b>	<ul style="list-style-type: none"><li>• Min/Max number of N queens must be placed on a board sized N-by-N.</li><li>• No queens can be in the same row, column, or diagonal.</li><li>• No solution for <math>N = 3</math> or <math>N = 2</math>.</li></ul>
<b>Evaluating the results</b>	When it comes to checking the results for the N-Queens puzzle, the program should always give a valid solution as there always exists a solution to the puzzle if all constraints are satisfied. As the program logic is to iterate through the 2D array data structure, the first possible solution will always be displayed. The program will be considered a success if it can find a solution for $N=8$ as this is the size of an actual chessboard.