PROBLEM DESCRIPTION

N - Queens. Problem is to place n - queens on a n x n chessboard such that no queen attacks the other queen by being on the same row, column or diagonal.

PARAMETERS

Parameter	***Description***	***Unit***
N	*Size of chess board (8)*	*-*

DECISION VARIABLES

Decision Variable	***Description***	***Unit***	***Type***	***Bounds***
X_{ij}	*1 if cell (i,j) is occupied with a queen*	*-*	*Binary*	*{0,1}*

OBJECTIVE FUNCTION

$$Minimise\ OBJ = Total\ number\ of\ queens = \sum_{i\in[1,8]} \sum_{j\in[1,8]} (X_{ij})$$

CONSTRAINTS

(1) Only one queen in each row

$$\sum_{j\in[1,8]} (X_{ij}) = 1 \quad \forall\, i \in [1,8]$$

(2) Only one queen in each column

$$\sum_{i\in[1,8]} (X_{ij}) = 1 \quad \forall\, j \in [1,8]$$

(3) At most one queen in each diagonal

$$\sum_{k\in[1,\min\{N-i,N-j\}]} (X_{i+k,j+k}) \leq 1 \quad \forall\, i,j \in [1,8]$$

$$\sum_{k\in[1,\min\{i+1,N-j\}]} (X_{i-k,j+k}) \leq 1 \quad \forall\, i,j \in [1,8]$$