Data Structures Lab 02

1. Task-1: Matrix Data Type

Develop a Matrix Data Type that has the following functionalities

__init__(row, col) : it initializes a matrix of size rows x cols with random values

__str__() : It returns the string representation of matrix

__repr__() : It is representation of Matrix object

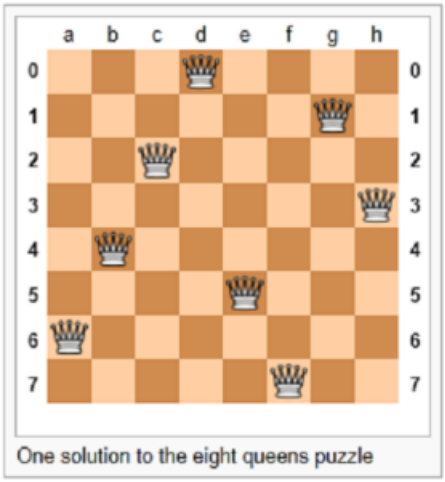
__add__() : it multiplies two matrices and returns a resultant matrix

__sub__() : it subtracts two matrices and returns a resultant matrix

__mul__() : it multiplies two matrices and returns a resultant matrix

transpose() :It returns the transpose of the matrix

2. **Task-2: EightQueens Data Type**
   - The eight-queens puzzle is the problem of placing eight chess queens on an 8x8 chessboard so that no two queens attack each other. Thus, a solution requires that no two queens share the same row, column, or diagonal.
   - A basic iterative algorithm starts by initially place the eight queens at random on the board subject to the constraint that there is only one queen on each row and column



One solution to the eight queens puzzle

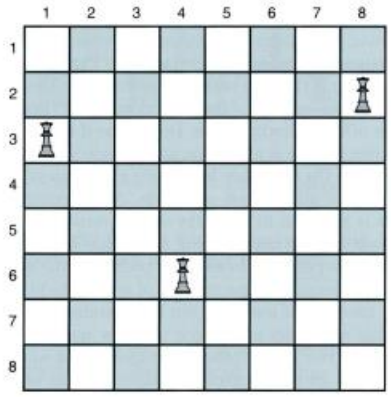
Check! if two queens are attacking

- Condition-1 (check two queens are in the same column). let col(i) be the column where the queen in the i_{th} row is located, then to check whether the queen in the k_{th} row is in the same column

$$col\,[i] = col\,[k]$$

- Condition-2 (check two queens are in the same diagonal)

$$|col\,(i) - col\,(k)| = |i - k|$$



3. **Task-3: TicTacToe Data Type**

Tic-tac-toe is a paper-and-pencil game for two players who take turns marking the spaces in a three-by-three grid with X or O. The player who succeeds in placing three of their marks in a horizontal, vertical, or diagonal row is the winner.

Write a class/Type/Data Type to play this game