Walchand College of Engineering, Sangli
Computer Science & Engineering
Third Year

Course: Design and analysis of algorithm Lab

Lab course coordinator:
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# Assignment No 10

# Backtracing\N Queens Problem

1) Given an integer **n**, the task is to find all distinct solutions to the n-**queens problem**, where **n** queens are placed on an **n×n** chessboard such that no two queens can attack each other.

Each solution is a unique configuration of **n** queens, represented as a permutation of **[1,2,3,….,n]**. The number at the **ith** position indicates the row of the queen in the **ith** column. For example, **[3,1,4,2]** shows one such layout.

**Input:** 4
**Output:** [2, 4, 1, 3 ], [3, 1, 4, 2]
**Explaination:** These are the 2 possible solutions.

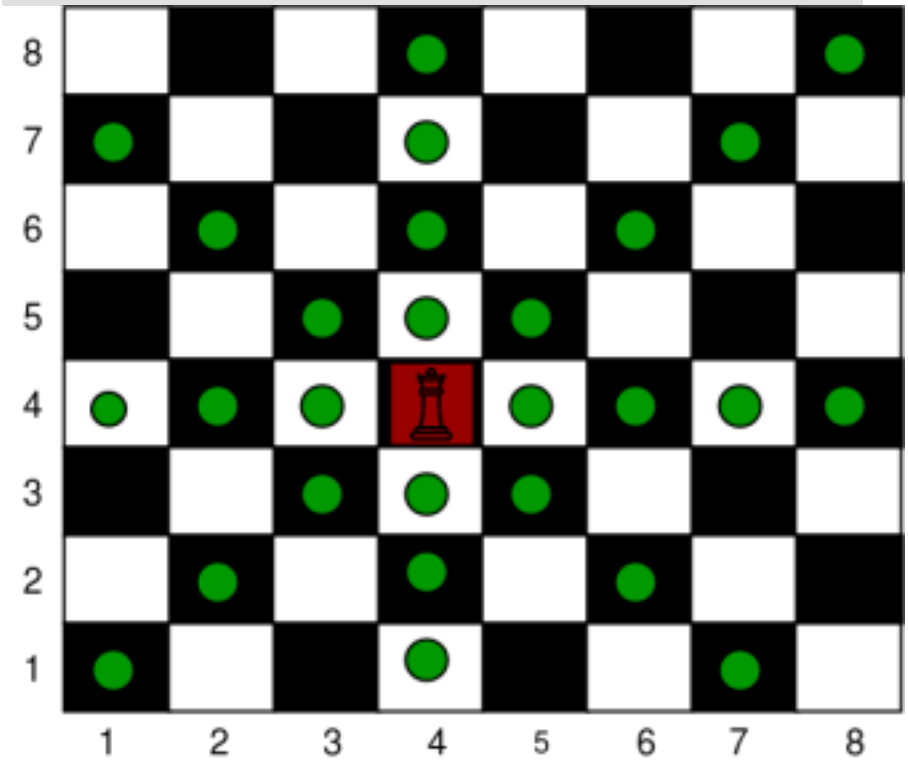
**Input:** 1
**Output:** [1]
**Explaination:** Only one queen can be placed in the single cell available.

2) Given the dimension of a chess board (N x M), determine the minimum number of queens required to cover all the squares of the board. A queen can attack any square along its row, column or diagonals.

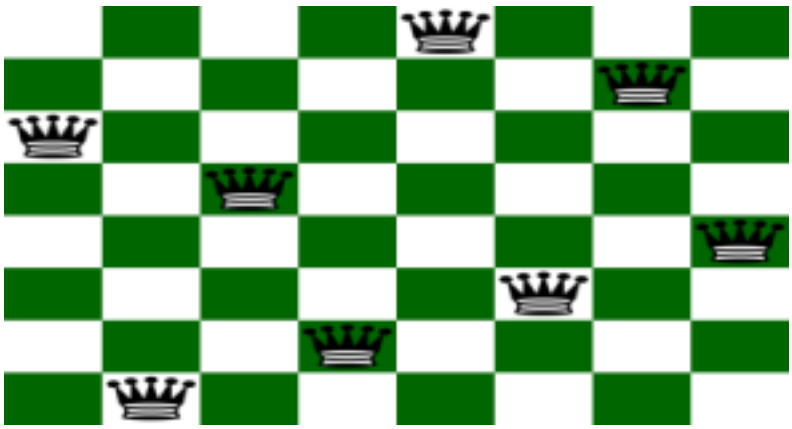
```
Input : N = 8, M = 8
Output : 5
Layout : Q X X X X X X X
         X X Q X X X X X
         X X X X Q X X X
         X Q X X X X X X
         X X X Q X X X X
         X X X X X X X X
         X X X X X X X X
         X X X X X X X X

Input : N = 3, M = 5
Output : 2
Layout : Q X X X X
         X X X X X
         X X X Q X
```

3) Consider a **N X N** chessboard with a Queen and **K** obstacles. The Queen cannot pass through obstacles. Given the position (x, y) of Queen, the task is to find the number of cells the queen can move.

```
Input : N = 8, x = 4, y = 4,
        K = 0
Output : 27
```




4) The **N** Queen is the problem of placing **N** chess queens on an **N×N** chessboard so that no two queens attack each other.
For example, the following is a solution for **8** Queen problem.



5) Given a valid sentence without any spaces between the words and a dictionary of valid English words, find all possible ways to break the sentence into individual dictionary words.

**Example:**

```
Consider the following dictionary
{ i, like, sam, sung, samsung, mobile, ice,
  and, cream, icecream, man, go, mango}

Input: "ilikesamsungmobile"
Output: i like sam sung mobile
        i like samsung mobile

Input: "ilikeicecreamandmango"
Output: i like ice cream and man go
        i like ice cream and mango
        i like icecream and man go
        i like icecream and mango
```