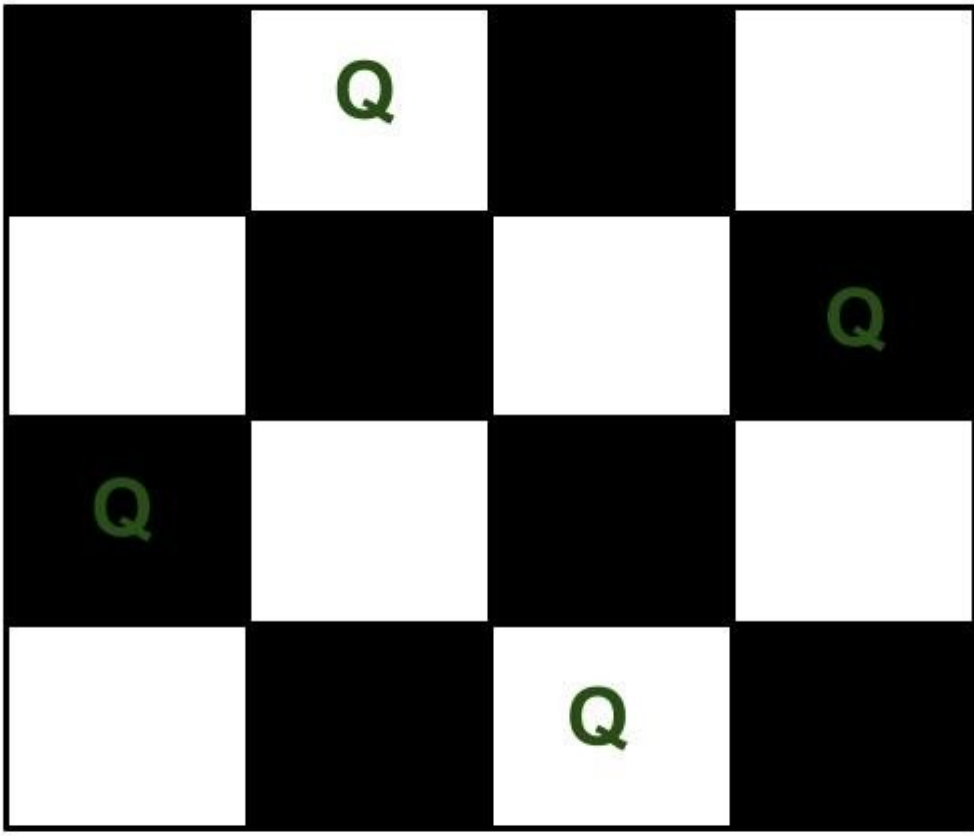
N-Queen Ways

You are given an empty chess board of size N*N. Find the number of ways to place N queens on the board, such that no two queens can kill each other in one move. A queen can move vertically, horizontally and diagonally.



Input Format:

In the function you are given an integer N as a parameter.

Output Format:

Return the number of possible solutions.

Constraints:

1<=N<=10

Sample Testcase 1:

Input:

4

Output:

2

Sample Testcase 2:

Input:

1

Output:

1

Solution: nQueenProblem.cpp

Rat and Mice

You are given an N*M grid. Each cell (i,j) in the grid is either blocked, or empty. The rat can move from a position towards left, right, up or down on the grid.
Initially rat is on the position (1,1). It wants to reach position (N,M) where its mice is waiting for. There exits a unique path in the grid . Find that path and help the rat reach its mice.

Input Format

Given vector of strings representing a grid with N rows and M columns.
'X' in position (i,j) denotes that the cell is blocked and 'O' denotes that the cell is empty.

Output Format

Print N lines, containing M integers each. A 1 at a position (i,j) denotes that the (i,j)th cell is covered in the path and a 0 denotes that the cell is not covered in the path.

Sample Input

```
5 40X00000XX0X0X00XXX00
```

Sample Output

```
1 0 0 0 1 1 0 0 0 1 0 0 0 1 1 0 0 0 1 1
```

Solution: ratMaze.cpp

Word Break Problem

Given a str which is a valid sentence without any spaces between the words and a dictionary of valid English words, find all possible number of ways to break the sentence in individual dictionary words.

Input Format

In the function a string str and a vector of strings representing dictionary is passed

Output Format

Return an integer representing the total no. of ways

Sample Input

```
dictionary = { i, like, sam, sung, samsung, mobile}str = "ilikesamsungmobile"
```

Sample Output

```
2
```

Explanation

Following are the 2 possible ways to break the string

```
 i like sam sung mobile i like samsung mobile
```

Solution: wordBreak.cpp

Unique Subset

Given an integer array `nums` that may contain duplicates, return *all possible subsets (the power set)*.

The solution set **must not** contain duplicate subsets. Return the solution in **ascending order**.

Input Format

In the function an integer vector is passed.

Output Format

Return a vector of vectors containing unique subsets.

Sample Input

```
[1,2,2]
```

Sample Output

```
[[],[1],[1,2],[1,2,2],[2],[2,2]]
```

Solution: uniqueSubsets.cpp

Word Search

Given an `m x n` grid of characters `board` and a string `word`, return `true` *if* `word` *exists in the grid*.

The word can be constructed from letters of sequentially adjacent cells, where adjacent cells are horizontally or vertically neighboring. The same letter cell may not be used more than once.

Input Format

In the function 2-d vector of character is passed.

Output Format

Return **true** if the word is present otherwise **false**.

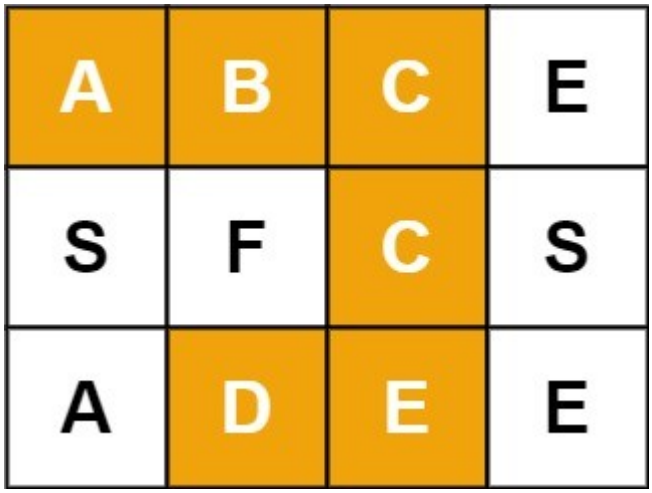
Sample Input

```
board = [["A","B","C","E"],["S","F","C","S"],["A","D","E","E"]] word = "ABCCED"
```

Sample Output

```
true
```

Explanation



Solution: wordSearch.cpp

Modulo Exponentiation

You are given two numbers a and b, your task is to compute a raised to power b.

As this value can be very large compute it to modulo 1000000007.

HINT : Use Modulo Properties

`(m * n) % p has a very interesting property: (m * n) % p =((m % p) * (n % p)) % p`

Expected Time Complexity:

`O(log b)`

Input Format:

In the function, 2 integers a and b are passed.

Output Format:

Return a single integer which is equivalent to (a^b) modulo 1000000007.

Constraints:

1<=a,b<=50

Sample Testcase:

Input:

5 3

Output:

125

Solution: moduloExp.cpp

Sudoku Solver

You are given a 9X9 2D array which is partially filled. Your aim is to completely fill the grid from digits from 1 to 9 such that every row, column and sub-grid of size 3X3 (as shown) contains all digits from 1 to 9 exactly once.

Input Format:

Input will have 2D vector(9X9 matrix)

	3					9		
		6						
			2	4	1		3	
			9			7		
					2			4
	8			7			2	
8	5							
	9		7		4			
					6			1

1	3	2	5	6	7	9	4	8
5	4	6	3	8	9	2	1	7
9	7	8	2	4	1	6	3	5
2	6	4	9	1	8	7	5	3
7	1	5	6	3	2	8	9	4
3	8	9	4	7	5	1	2	6
8	5	7	1	2	3	4	6	9
6	9	1	7	5	4	3	8	2
4	2	3	8	9	6	5	7	1

containing integers from 0 to 9 where 0 represents empty cell and other integers represent already filled cells.

Output Format:

Return a solved 2D vector(matrix).

Sample Testcase:

Input:

030000900

006000000

000241030

000900700

000002004

080070020

850000000

090704000

000006001

Output:

132567948

546389217

978241635

264918753

715632894

389475126

857123469

691754382

423896571

Solution: sudokuSolver.cpp