Problem 3393: Count Paths With the Given XOR Value

Problem Information

Difficulty: Medium
Acceptance Rate: 40.20%
Paid Only: No
Tags: Array, Dynamic Programming, Bit Manipulation, Matrix

Problem Description

You are given a 2D integer array `grid` with size `m x n`. You are also given an integer `k`.

Your task is to calculate the number of paths you can take from the top-left cell `(0, 0)` to the bottom-right cell `(m - 1, n - 1)` satisfying the following **constraints** :

* You can either move to the right or down. Formally, from the cell `(i, j)` you may move to the cell `(i, j + 1)` or to the cell `(i + 1, j)` if the target cell _exists_. * The `XOR` of all the numbers on the path must be **equal** to `k`.

Return the total number of such paths.

Since the answer can be very large, return the result **modulo** `109 + 7`.

Example 1:

Input: grid = [[2, 1, 5], [7, 10, 0], [12, 6, 4]], k = 11

Output: 3

Explanation:

The 3 paths are:

* `(0, 0) -> (1, 0) -> (2, 0) -> (2, 1) -> (2, 2)` * `(0, 0) -> (1, 0) -> (1, 1) -> (1, 2) -> (2, 2)` * `(0, 0) -> (0, 1) -> (1, 1) -> (2, 1) -> (2, 2)`

Example 2:

Input: grid = [[1, 3, 3, 3], [0, 3, 3, 2], [3, 0, 1, 1]], k = 2

Output: 5

Explanation:

The 5 paths are:

* `(0, 0) -> (1, 0) -> (2, 0) -> (2, 1) -> (2, 2) -> (2, 3)` * `(0, 0) -> (1, 0) -> (1, 1) -> (2, 1) -> (2, 2) -> (2, 3)` * `(0, 0) -> (1, 0) -> (1, 1) -> (1, 2) -> (1, 3) -> (2, 3)` * `(0, 0) -> (0, 1) -> (1, 1) -> (1, 2) -> (2, 2) -> (2, 3)` * `(0, 0) -> (0, 1) -> (0, 2) -> (1, 2) -> (2, 2) -> (2, 3)`

Example 3:

Input: grid = [[1, 1, 1, 2], [3, 0, 3, 2], [3, 0, 2, 2]], k = 10

Output: 0

Constraints:

* `1 <= m == grid.length <= 300` * `1 <= n == grid[r].length <= 300` * `0 <= grid[r][c] < 16` * `0 <= k < 16`

Code Snippets

C++:

```
class Solution {
public:
    int countPathsWithXorValue(vector<vector<int>>& grid, int k) {


    }
};
```

Java:

```java
class Solution {
public int countPathsWithXorValue(int[][] grid, int k) {


}
}
```

Python3:

```python
class Solution:
def countPathsWithXorValue(self, grid: List[List[int]], k: int) -> int:
```