2912. Number of Ways to Reach Destination in the Grid Premium

Hard | Topics | Companies | Hint

You are given two integers `n` and `m` which represent the size of a **1-indexed** grid. You are also given an integer `k`, a **1-indexed** integer array `source` and a **1-indexed** integer array `dest`, where `source` and `dest` are in the form `[x, y]` representing a cell on the given grid.

You can move through the grid in the following way:

- You can go from cell `[x1, y1]` to cell `[x2, y2]` if either `x1 == x2` or `y1 == y2`.
- Note that you **can't** move to the cell you are already in e.g. `x1 == x2` and `y1 == y2`.

Return *the number of ways you can reach* `dest` *from* `source` *by moving through the grid* **exactly** `k` *times.*

Since the answer may be very large, return it **modulo** `10^9 + 7`.

Example 1:

```
Input: n = 3, m = 2, k = 2, source = [1,1], dest = [2,2]
Output: 2
Explanation: There are 2 possible sequences of reaching [2,2] from [1,1]:
- [1,1] -> [1,2] -> [2,2]
- [1,1] -> [2,1] -> [2,2]
```

Example 2:

```
Input: n = 3, m = 4, k = 3, source = [1,2], dest = [2,3]
Output: 9
Explanation: There are 9 possible sequences of reaching [2,3] from [1,2]:
- [1,2] -> [1,1] -> [1,3] -> [2,3]
- [1,2] -> [1,1] -> [2,1] -> [2,3]
- [1,2] -> [1,3] -> [3,3] -> [2,3]
- [1,2] -> [1,4] -> [1,3] -> [2,3]
- [1,2] -> [1,4] -> [2,4] -> [2,3]
- [1,2] -> [2,2] -> [2,1] -> [2,3]
- [1,2] -> [2,2] -> [2,4] -> [2,3]
- [1,2] -> [3,2] -> [2,2] -> [2,3]
- [1,2] -> [3,2] -> [3,3] -> [2,3]
```

Constraints:

- `2 <= n, m <= 10^9`
- `1 <= k <= 10^5`
- `source.length == dest.length == 2`
- `1 <= source[1], dest[1] <= n`
- `1 <= source[2], dest[2] <= m`

Seen this question in a real interview before? 1/5

Yes No

Accepted 956 | Submissions 1.6K | Acceptance Rate 60.3%

Topics

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Companies

0 - 6 months

Uber 2

Hint 1

We are asked to count the number of sequences of length `k + 1` that start from `(xs, ys)` and end with `(xd, yd)`. i.e., `(xs, ys), (x1, y1), ..., (xk - 1, yk - 1), (xd, yd)`.

Hint 2

The key point is to see `x` and `y` separately.

Hint 3

Suppose we do `i` vertical moves and `k - i` horizontal moves.

Hint 4

In each vertical move, we change only `y`. Now let's count the number of sequences of length `i + 1` that start with `source[2]` and end with `dest[2]`. Let's call this number `vertical_count`.

Hint 5

Do the same for horizontal moves and let it be `horizontal_count`.

Hint 6

For each `i`, the number of ways would be `vertical_count * horizontal_count * C(n, i)` since the order of vertical and horizontal moves could be arbitrary.

Discussion (1)