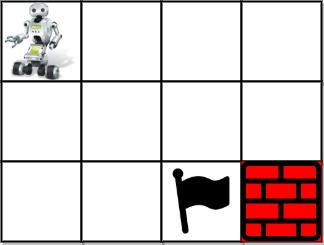
**[Unique Paths III](https://leetcode.com/problems/unique-paths-iii/description/)**

You are given an m x n integer array grid where grid[i][j] could be:

* 1 representing the starting square. There is exactly one starting square.
* 2 representing the ending square. There is exactly one ending square.
* 0 representing empty squares we can walk over.
* -1 representing obstacles that we cannot walk over.

Return *the number of 4-directional walks from the starting square to the ending square, that walk over every non-obstacle square exactly once*.

**Example 1:**



**Input:** grid = [[1,0,0,0],[0,0,0,0],[0,0,2,-1]]

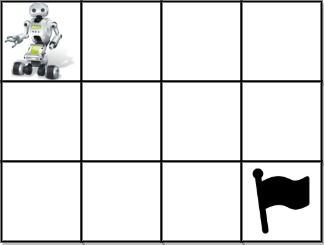
**Output:** 2

**Explanation:** We have the following two paths:

1. (0,0),(0,1),(0,2),(0,3),(1,3),(1,2),(1,1),(1,0),(2,0),(2,1),(2,2)

2. (0,0),(1,0),(2,0),(2,1),(1,1),(0,1),(0,2),(0,3),(1,3),(1,2),(2,2)

**Example 2:**



**Input:** grid = [[1,0,0,0],[0,0,0,0],[0,0,0,2]]

**Output:** 4

**Explanation:** We have the following four paths:

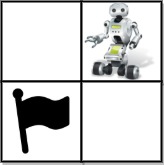
1. (0,0),(0,1),(0,2),(0,3),(1,3),(1,2),(1,1),(1,0),(2,0),(2,1),(2,2),(2,3)

2. (0,0),(0,1),(1,1),(1,0),(2,0),(2,1),(2,2),(1,2),(0,2),(0,3),(1,3),(2,3)

3. (0,0),(1,0),(2,0),(2,1),(2,2),(1,2),(1,1),(0,1),(0,2),(0,3),(1,3),(2,3)

4. (0,0),(1,0),(2,0),(2,1),(1,1),(0,1),(0,2),(0,3),(1,3),(1,2),(2,2),(2,3)

**Example 3:**



**Input:** grid = [[0,1],[2,0]]

**Output:** 0

**Explanation:** There is no path that walks over every empty square exactly once.

Note that the starting and ending square can be anywhere in the grid.

**Constraints:**

* m == grid.length
* n == grid[i].length
* 1 <= m, n <= 20
* 1 <= m \* n <= 20
* -1 <= grid[i][j] <= 2
* There is exactly one starting cell and one ending cell.