

# 1727. Cat and Mouse II

## Difficulty : Hard

<https://leetcode.com/problems/cat-and-mouse-ii>

A game is played by a cat and a mouse named Cat and Mouse.

The environment is represented by a grid of size `rows` x `cols`, where each element is a wall, floor, player (Cat, Mouse), or food.

- Players are represented by the characters 'C' (Cat), 'M' (Mouse).
- Floors are represented by the character '.' and can be walked on.
- Walls are represented by the character '#' and cannot be walked on.
- Food is represented by the character 'F' and can be walked on.
- There is only one of each character 'C', 'M', and 'F' in grid.

Mouse and Cat play according to the following rules:

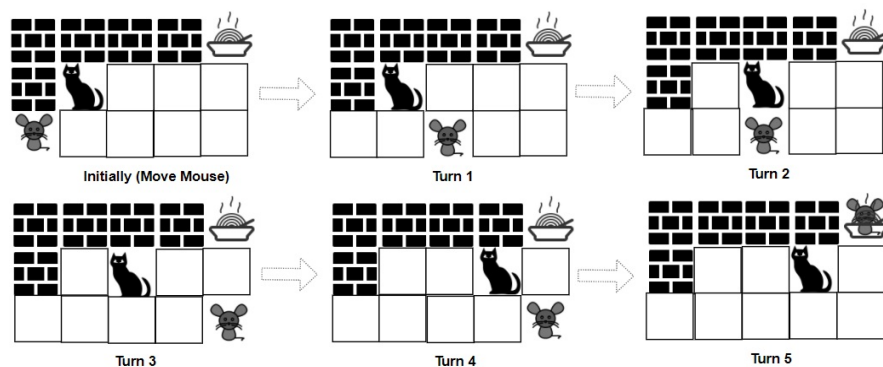
- Mouse **moves first**, then they take turns to move.
- During each turn, Cat and Mouse can jump in one of the four directions (left, right, up, down). They cannot jump over the wall nor outside of the grid.
- `catJump`, `mouseJump` are the maximum lengths Cat and Mouse can jump at a time, respectively. Cat and Mouse can jump less than the maximum length.
- Staying in the same position is allowed.
- Mouse can jump over Cat.

The game can end in 4 ways:

- If Cat occupies the same position as Mouse, Cat wins.
- If Cat reaches the food first, Cat wins.
- If Mouse reaches the food first, Mouse wins.
- If Mouse cannot get to the food within 1000 turns, Cat wins.

Given a `rows` x `cols` matrix `grid` and two integers `catJump` and `mouseJump`, return `true` if Mouse can win the game if both Cat and Mouse play optimally, otherwise return `false`.

### Example 1:

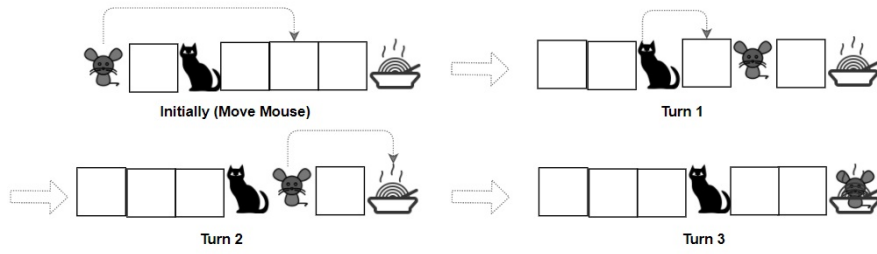


**Input:** `grid = ["####F", "#C...", "M...."]`, `catJump = 1`, `mouseJump = 2`

**Output:** `true`

**Explanation:** Cat cannot catch Mouse on its turn nor can it get the food before Mouse.

### Example 2:



**Input:** grid = ["M.C...F"], catJump = 1, mouseJump = 4  
**Output:** true

### Example 3:

**Input:** grid = ["M.C...F"], catJump = 1, mouseJump = 3  
**Output:** false

### Constraints:

- rows == grid.length
- cols = grid[i].length
- 1 <= rows, cols <= 8
- grid[i][j] consist only of characters 'C', 'M', 'F', '.', and '#'.
- There is only one of each character 'C', 'M', and 'F' in grid.
- 1 <= catJump, mouseJump <= 8