Problem G
Grid Tiling

Time limit: 2 seconds
Memory limit: 512 megabytes

Problem Description

You are given an n-by-n grid wall with m holes. Each grid cell is a square, and there is at most one hole on any grid cell. Your boss ask you to tile the wall with 2-by-1 tiles. Each tile can cover two adjacent grid cells. The tiling must satisfy the following conditions.

- The cells without a hole must be covered by a tile.
- The cells with a hole must not be covered by any tile.
- Each tile must exactly cover two cells.

For example, the following figure shows two ways to tile a 3-by-3 wall with 1 hole on the center grid cell.

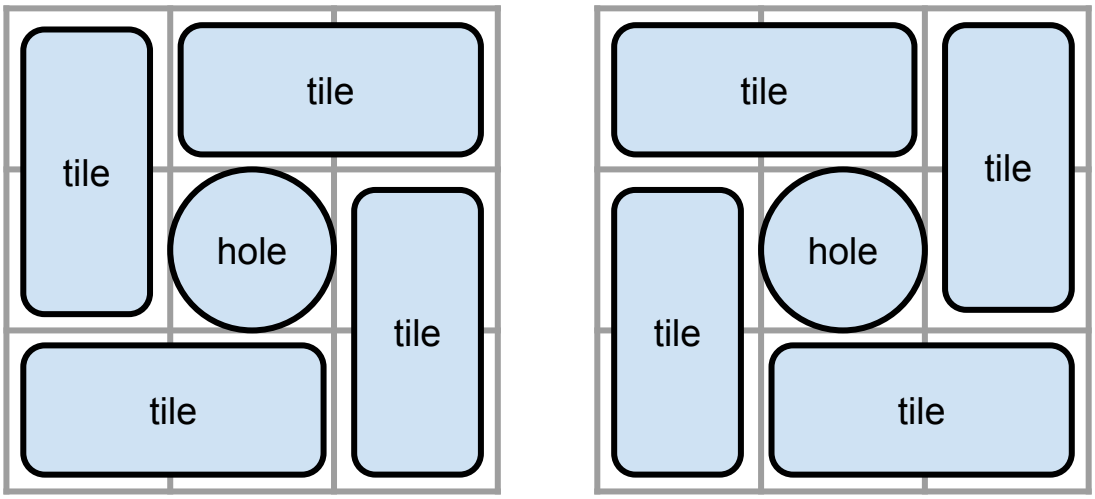

Figure 2: Two ways to tile

Please write a program to compute the number of ways to tile the given grid wall without violating the conditions. The number can be large, if it is greater than $1,000,000,006$, please output the number modulo $1,000,000,007$.

Input Format

The first line contains two integers n and m. The wall is an n-by-n grid and has m holes.

The followin m lines describes the holes. The i-th of them contains two positive integers r_i and c_i indicating there is a hole on the cell lying on row r_i and column c_i.

Output Format

Output the number of ways to tile the wall without violating the conditions modulo $1,000,000,007$ on a line.

Technical Specification

- $1 \leq n \leq 16$
- $0 \leq m \leq n^2$
- $r_i, c_i \in [1, n]$ for $i \in [1, m]$.
- There is at most one hole on any grid cell.

Sample Input 1

```
3 1
2 2
```

Sample Output 1

```
2
```

Sample Input 2

```
2 2
1 1
2 2
```

Sample Output 2

```
0
```

Sample Input 3

```
4 4
1 4
2 1
3 4
4 1
```

Sample Output 3

```
0
```

Sample Input 4

```
16 0
```

Sample Output 4

```
378503901
```

Hint

This problem is hard.