Problem J. Simple APSP Problem

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	256 mebibytes

You are given an $H \times W$ grid. The square at the top-left corner is indexed $(0, 0)$, and the square at the bottom-right corner is indexed by $(H - 1, W - 1)$.

N squares $(x_1, y_1), (x_2, y_2), \ldots, (x_N, y_N)$ are painted black, and all other squares are painted white.

Let the shortest distance between white squares A and B be the minimum number of moves required to reach B from A **visiting only white squares**, where one can travel to an adjacent square sharing a side (up, down, left or right) in one move.

Since there are $H \times W - N$ white squares in total, there are $C^2_{H \times W - N}$ ways to choose two of the white squares. For each of these $C^2_{H \times W - N}$ ways, find the shortest distance between the chosen squares, then find the sum of all those distances, modulo $1\,000\,000\,007 = 10^9 + 7$.

Input

Input is given in the following format:

H W

N

x_1 y_1

x_2 y_2

...

x_N y_N

Constraints:

$1 \leq H, W \leq 10^6$, $1 \leq N \leq 30$, $0 \leq x_i \leq H - 1$, $0 \leq y_i \leq W - 1$. If $i \neq j$, then either $x_i \neq x_j$ or $y_i \neq y_j$. It is guaranteed that there is at least one white square. For every pair of white squares A and B, it is possible to reach B from A visiting only white squares.

Output

Print the sum of the shortest distances modulo $10^9 + 7$.

Examples

standard input	standard output
2 3 1 1 1	20
2 3 1 1 2	16
3 3 1 1 1	64
4 4 4 0 1 1 1 2 1 2 2	268
1000000 1000000 1 0 0	333211937

Note

In Sample 1, we have the next grid ('.' denotes white square, '!' — black square):

```
...
.!.
```

We assign alphabet to white squares, like below.

```
ABC
D!E
```

So we get (here $dist(A, B)$ is the shortest distance between A and B):

$dist(A, B) = 1$, $dist(A, C) = 2$, $dist(A, D) = 1$, $dist(A, E) = 3$, $dist(B, C) = 1$, $dist(B, D) = 2$, $dist(B, E) = 2$, $dist(C, D) = 3$, $dist(C, E) = 1$, $dist(D, E) = 4$, and sum of those is 20.

In Sample 2, we assign alphabet to white squares, like below.

```
ABC
DE!
```

So we get:

$dist(A, B) = 1$, $dist(A, C) = 2$, $dist(A, D) = 1$, $dist(A, E) = 2$, $dist(B, C) = 1$, $dist(B, D) = 2$, $dist(B, E) = 1$, $dist(C, D) = 3$, $dist(C, E) = 2$, $dist(D, E) = 1$, and sum of those is 16.