DMOPC '18 Contest 2 P6 - Standing Ovation (Hard Version)

Time limit: 3.0s **Memory limit:** 1G

At the Nova Theatre, the balcony seats can be seen as a grid with M rows and N columns. The theatre is packed and the seats are all filled. At the end of the play, K people in the balcony stand to give their applause. The i^{th} of these K people is sitting in row r_i, column c_i. The rest of the $M \times N$ people will only stand if at least two people adjacent to them are standing. How many people will end up standing?

Constraints

$K \leq \min(500\,000, M \times N)$

$1 \leq r_i \leq M$ for all $1 \leq i \leq K$

$1 \leq c_i \leq N$ for all $1 \leq i \leq K$

$1 \leq M, N \leq 500\,000$

Input Specification

The first line will contain three space-separated integers, M, N, K.
The next K lines each contain two space-separated integers, r_i and c_i, representing the i^{th} person initially standing.

Sample Input 1

```
3 4 5
1 1
1 2
1 3
2 1
3 1
```

Sample Output 1

```
9
```

Explanation for Sample 1

Initially, the grid appears as:

```
S S S 0
S 0 0 0
S 0 0 0
```

where `S` denotes someone standing and `0` denotes someone sitting.
Then it becomes:

```
S S S 0
S S 0 0
S 0 0 0
```

Then:

```
S S S 0
S S S 0
S S 0 0
```

Finally:

```
S S S 0
S S S 0
S S S 0
```

No more people stand, so the 9 people end up standing.

Sample Input 2

```
3 5 4
1 1
3 1
1 4
2 5
```

Sample Output 2

```
7
```

Sample Input 3

```
3 5 4
1 1
3 1
1 3
2 4
```

Sample Output 3

```
12
```