

Contest Duration: 2025-07-05(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250705T2100&p1=248>) - 2025-07-05(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250705T2240&p1=248>) (local time) (100 minutes)

iso=20250705T2100&p1=248) - 2025-07-05(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250705T2240&p1=248>) (local time) (100 minutes)

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## F - No Passage

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Time Limit: 2.5 sec / Memory Limit: 1024 MiB

Score : 525 points

### Problem Statement

There is an  $H \times W$  grid. Let  $(i, j)$  denote the cell at the  $i$ -th row from the top and  $j$ -th column from the left. Among these,  $K$  cells are goals. The  $i$ -th goal ( $1 \leq i \leq K$ ) is cell  $(R_i, C_i)$ .

Takahashi and Aoki play a game using this grid and a single piece placed on the grid.

Takahashi and Aoki repeatedly perform the following series of operations until the piece reaches a goal cell:

- Aoki chooses an integer  $a$  between 1 and 4, inclusive.
- Then, Takahashi chooses an integer  $b$  between 1 and 4, inclusive, where  $a \neq b$  must be satisfied. Let  $(i, j)$  be the cell where the piece is placed before the operation. Based on the chosen integer  $b$  and the piece's position, move the piece.
  - When  $b = 1$ : If  $(i - 1, j)$  is within the grid, move the piece from cell  $(i, j)$  to cell  $(i - 1, j)$ ; if it is outside the grid, do nothing.
  - When  $b = 2$ : If  $(i + 1, j)$  is within the grid, move the piece from cell  $(i, j)$  to cell  $(i + 1, j)$ ; if it is outside the grid, do nothing.
  - When  $b = 3$ : If  $(i, j - 1)$  is within the grid, move the piece from cell  $(i, j)$  to cell  $(i, j - 1)$ ; if it is outside the grid, do nothing.
  - When  $b = 4$ : If  $(i, j + 1)$  is within the grid, move the piece from cell  $(i, j)$  to cell  $(i, j + 1)$ ; if it is outside the grid, do nothing.

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Takahashi's objective is to minimize the number of moves until the piece reaches a goal. Aoki's objective is to prevent the piece from reaching the goal; if that is impossible, his objective is to maximize the number of moves until the piece reaches a goal.

For all pairs of integers  $(i, j)$  satisfying  $1 \leq i \leq H, 1 \leq j \leq W$ , solve the following problem and find the sum of all solutions:

Start the game with the piece at cell  $(i, j)$ . Assume both players act optimally toward their respective objectives. If Takahashi can make the piece reach a goal, the solution is the minimum number of moves; otherwise, the solution is 0.

## Constraints

- $2 \leq H \leq 3000$
- $2 \leq W \leq 3000$
- $1 \leq K \leq \min(HW, 3000)$
- $1 \leq R_i \leq H$
- $1 \leq C_i \leq W$
- $(R_i, C_i) \neq (R_j, C_j) (1 \leq i < j \leq K)$
- All input values are integers.

## Input

The input is given from standard input in the following format:

```
H W K
R1 C1
R2 C2
⋮
RK CK
```

## Output

Print the answer.

## Sample Input 1

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

## Sample Output 1

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```
2
```

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When  $(i, j) = (1, 2), (2, 1)$ , the starting cell is a goal, so the solution is 0.

When  $(i, j) = (1, 1), (2, 2)$ , no matter which  $a$  Aoki chooses, Takahashi can make the piece reach a goal in 1 move from the starting cell, so the solution is 1.

When  $(i, j) = (1, 3), (2, 3)$ , Takahashi cannot reach a goal, so the solution is 0.

The sum of these is  $0 \times 2 + 1 \times 2 + 0 \times 2 = 2$ . Thus, print 2.

## Sample Input 2

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```
9 3 9
1 3
6 1
4 1
1 2
2 1
7 1
9 3
8 1
9 2
```

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## Sample Output 2

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```
43
```

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## Sample Input 3

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10 10 36  
3 8  
5 10  
3 10  
6 10  
2 10  
2 8  
7 10  
1 10  
1 8  
7 6  
7 8  
2 5  
1 6  
8 8  
7 5  
2 4  
9 8  
7 4  
4 3  
10 10  
10 8  
8 10  
10 6  
6 2  
4 2  
10 5  
8 3  
1 2  
2 1  
4 1  
10 4  
10 3  
8 1  
6 1  
10 2  
9 1

## Sample Output 3

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153

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