DMOPC '20 Contest 4 P2 - Beautiful Grids

Time limit: 2.0s **Memory limit:** 256M

Penelope is playing a game on an $N \times M$ grid! Her grid currently contains K 1s, while the rest of her grid cells contain 0s.

Penelope isn't sure she likes her grid though. Specifically, she is worried that her grid isn't *beautiful*. A grid is beautiful if every row sum and column sum are even.

Penelope is in a hurry to make her grid beautiful so she asks you: how can she make her grid beautiful? On each move, you can flip the value of a grid cell: from 1 to 0 or 0 to 1. Since she is in a hurry, she asks you to make her grid beautiful as fast as possible.

Constraints

$1 \leq N, M \leq 10^{18}$

$0 \leq K \leq \min(N \times M, 3 \times 10^5)$

$1 \leq a_i \leq N$

$1 \leq b_i \leq M$

All cells given are distinct.

Subtask 1 [30%]

$1 \leq N, M \leq 5000$

Subtask 2 [70%]

No additional constraints.

Input Specification

The first line contains 3 integers, N, the number of rows; M, the number of columns; and K.

The next K lines each contain two integers a_i and b_i, indicating that the cell in the a_i^{th} row, b_i^{th} column contains a 1.

Output Specification

On the first line output A, the minimum number of moves required to make the grid beautiful. A must satisfy $0 \leq A \leq 10^6$. It can be proven that the minimum A lies within this range.

On the next A lines, output two space-separated integers a_i and b_i, indicating that you will flip the cell in the a_i^{th} row, b_i^{th} column.

You may output any valid sequence.

Note: your output must follow the standard convention of not having any extra whitespace, and it must end with a new line.

Scoring

If you output an incorrect value A, but a valid sequence of moves, you will receive 10% for that test case.

If you output a correct value A, but an invalid sequence of moves, you will receive 20% for that test case.

If you output a correct value of A and any valid sequence of moves, you will receive 100% for that test case.

Your score for a subtask will be the minimum score across all test cases of that subtask.

Sample Input

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

Sample Output

```
1
2 3
```

Explanation

Note that after our operation, our grid is:

```
1 0 1
1 0 1
```

which satisfies the constraints.