New Year's '17 P2 - Peter's Escape

Time limit: 1.8s   **Memory limit:** 256M

Peter the penguin is lost in an icy cave! Upon closer observation, he notices that he can represent the cave as an $N \times M$ rectangle in the Cartesian plane. However, the ice is very slippery, and he can only stop and change directions when he slides onto one of O rock patches. In addition to this, he fears getting lost, so he will **only move parallel to the axes**.

Peter, much like any other sane penguin, is averse to sliding onto a rock patch, and as such, wishes to ask you a question: what is the minimum number of times he will do so while escaping the cave?

If there are two adjacent rock patches, (e.g. one at $(2, 2)$ and another at $(2, 3)$), they are counted separately (i.e. he has slid over 2 rock patches).

Note: The cave is unbounded (i.e. there are no walls).

Input Specification

Line 1: two space separated integers, N and M ($1 \leq N, M \leq 10^9$).
Line 2: two space separated integers, X ($1 \leq X \leq N$) and Y ($1 \leq Y \leq M$), Peter's starting position.
Line 3: an integer, O ($1 \leq O \leq 10^5$).
Lines $4 \ldots O + 3$: two space separated integers, x_i ($1 \leq x_i \leq N$) and y_i ($1 \leq y_i \leq M$), which represent the position of an obstacle. It is guaranteed that Peter's starting position will never be an obstacle.
Line $O + 4$: an integer, E ($1 \leq E \leq 10^5$), the number of exits.
Lines $O + 5 \ldots O + E + 4$, two integers, x_i ($1 \leq x_i \leq N$), and y_i ($1 \leq y_i \leq M$), the coordinates of an exit. It is guaranteed that Peter's starting position will never be an exit, and that no exit will contain an obstacle.

Output Specification

The output should consist of one integer, the minimum number of times Peter will slide over a rock patch while escaping the cave. If it is not possible to escape the cave, output `-1` instead.

Subtasks

For 20% of points, $N, M \leq 1\,000$.

Sample Input

```
10 10
1 1
3
4 4
4 1
8 9
2
10 4
2 8
```

Sample Output

```
2
```