

Mirrors and Lasers

Input file: mirrorslasers.txt

You arrive at the corner $(0, 0)$ of a two dimensional room, holding a laser pointer. There are mirrors covering the walls, and the sign outside the room says to aim the laser pointer to attempt to hit the sensor in the opposite corner of the room (l, w) in the fewest reflections possible. There are several double sided mirrors in the room, each with non reflective edges (beams are not affected by edges of mirrors). You are thinking of several angles at which to aim the laser pointer and would like to know how many reflections each path would take.

Input:

Four space separated integers, l , w , m , and n , specifying the length ($1 < l < 100$) and width ($1 < w < 100$) of the room, number of mirrors ($0 < m < 15$), and number of angles to test ($0 < n < 10$).

For the next n lines:

Four space-separated integers, $x1$, $y1$, $x2$, $y2$, specifying the location of the endpoints $[(x1, y1), (x2, y2)]$ of the double sided mirror.

For the next m lines:

Two space separated integers, x and y , specifying the coordinate the laser is initially pointed towards.

All coordinates in the input are guaranteed to be non negative integers.

Output:

For each angle, print the number of reflections the laser will take to reach the sensor, or -1 if the laser does not hit the sensor.

Example Input:

```
10 10 1 3
0 5 4 5
1 1
1 2
8 10
```

Example Output:

```
0
2
-1
```