Mock CCC '23 2 S5 - The Obligatory Data Structures Problem

Time limit: 2.0s **Memory limit:** 1G

Mock CCC would not be a real mock CCC without a data structures problem, would it?

You are given a function f that maps $\mathbb{Z}^2$ to $\mathbb{Z}$. f is zero everywhere except at N points.

You must answer Q queries, as follows

- `Query(x_a, y_a, x_b, y_b)` - let S be the multiset of all integers $f(x, y)$ where $x_a \leq x \leq x_b$, $y_a \leq y \leq y_b$, and $f(x, y)$ is positive. Return `1` if there is a submultiset of S of size 3 where the three elements of the submultiset, when interpreted as side lengths, form a non-degenerate triangle.

Scoring

To get full marks, your solution must solve all test cases in under 0.5 seconds.

If your solution solves all test cases in under 1 second, you get 7 marks.

If your solution solves all test cases in under 1.5 seconds, you get 3 marks.

If your solution solves all test cases in under 2 seconds, you get 1 mark.

Constraints

$1 \leq N, Q \leq 10^5$

$1 \leq x, y, z \leq 10^9$

$1 \leq x_a \leq x_b \leq 10^9$

$1 \leq y_a \leq y_b \leq 10^9$

Input Specification

The first line contains two integers, N and Q.

The next N lines contain three integers, x, y, and z, indicating that $f(x, y) = z$.

The next Q line contain four integers, x_a, y_a, x_b, and y_b.

Output Specification

Output Q lines. On the ith line, output `Query(x_a, y_a, x_b, y_b)`.

Sample Input

```
9 5
1 3 3
2 3 1
3 3 4
1 2 1
2 2 5
3 2 9
1 1 2
2 1 6
3 1 5
1 1 1 2
1 1 2 2
1 1 1 3
1 2 3 2
1 1 3 3
```

Sample Output

```
0
1
0
0
1
```