Problem M
The Summit from Where I Stand
Time limit: 1 second

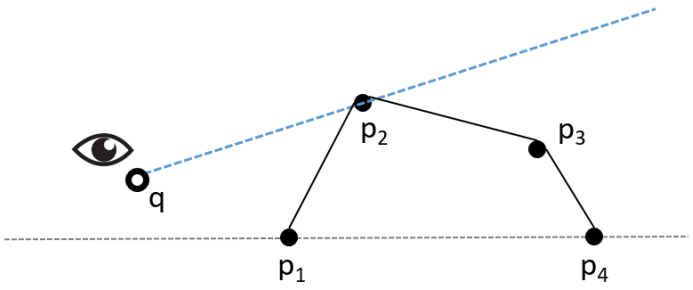
Ivan loves climbing mountains. When he is on his hiking trip, he often looks into the distance and observes the peaks of the surrounding mountains. He found an interesting fact that, when he looks towards the same mountain from different viewpoints, the "uppermost" point of the mountain he can see varies with the position he currently stands in.

To simplify the scenario, assume that Ivan's position is described by a point $\mathbf{q} = (x_q, y_q)$ in the second quadrant of the 2-D plane and the shape of the mountain is described by a convex polygonal curve $\mathbf{p}_1 = (x_1, y_1), \mathbf{p}_2 = (x_2, y_2), \ldots, \mathbf{p}_n = (x_n, y_n)$ in the first quadrant of the plane which begins and ends both at the x-axis.

You can further assume that

- $0 < |x_q| \leq 10^5$, $|y_q| \leq 10^8$,
- $x_1, x_2, \ldots, x_n$ is non-decreasing, and
- $\max\limits_{1 \leq i \leq n} \{|x_i|, |y_i|\} \leq 10^8$.

Given Ivan's position and the curve of the mountain he is observing, the uppermost point of the mountain, or, the summit point, Ivan sees from his current position is defined to be the upper tangent point of his eyesight towards the curve of the mountain. The uppermost point is defined to be $\mathbf{p}_n$ if no such tangent point exists.



In this problem you are to verify Ivan's intriguing observation. Given the curve of the mountain and a set of m viewpoints from which Ivan has observed that mountain during his hiking trip, please output the index of the summit point he sees at each viewpoint.

Input Format

The input consists of multiple testcases. Each testcase starts with a line containing two integers n and m, where $3 \leq n \leq 10^5$ and $1 \leq m \leq 10^5$.

Then there are n lines, each of which contains two integers x_i and y_i as described above. After that there are m lines, one for each query viewpoint. Each of these m lines contains two integers which are the coordinates of each query viewpoint.

A testcase starting with $n = m = 0$ indicates the end of input.

Output Format

For each viewpoint in each testcase of the input, print the index of the summit point Ivan sees in a line. If there are multiple solutions, print the one with the smallest index.

Sample Input

```
3 4
0 0
0 10
10 0
-1 0
-1 5
-1 11
-1 12
3 1
0 0
1 1
2 0
-2 1
0 0
```

Sample Output for the Sample Input

```
2
2
2
3
2
```