NOI '17 P6 - Magic

Time limit: 3.0s **Memory limit:** 512M

Description

There are n clones of Little P on the plane. Define the area occupied by a group of instances as the smallest convex polygon that covers this group of instances. Little P has limited abilities, and some clones will disappear every moment. But before the next moment, Little P will use the magic technique to make these disappeared clones reappear in their original positions.

Given m queries, after each moment when the clone disappears, what is the area occupied by the remaining clone?

Input Specification

The first line of input contains two positive integers n, m, describing the number of clones at the beginning and the total number of quries.

The next n line, the i line has two integers x_i, y_i , describing the position of the ith clone.

In the next m lines, the first integer k in each line indicates that k clones have disappeared at this moment. Next there are k non-negative integers $c_1, c_2, \ldots, c_k$, which are used to generate the numbers of the disappeared clones.

Generated as follows:

Assume **twice** the area occupied by the avatar at the previous moment is S. Then the numbers of the clones $p_1, p_2, \ldots, p_k$ that disappeared at this moment are: $p_i = [(S + c_i) \bmod n] + 1$.

In particular, at the first moment, we believe that $S = -1$ in the previous moment, that is: the numbers of the clones $p_1, p_2, \ldots, p_k$ that disappeared at the first moment are: $p_i = [(-1 + c_i) \bmod n] + 1$.

Output Specification

Output the m lines sequentially in the order of the given time, each line is an integer, representing **twice** the area occupied by the remaining clones at that time.

Sample Input

```
6 2
-1 0
-1 -1
0 -1
1 0
0 1
0 0
3 1 3 6
2 0 1
```

Sample Output

```
3
2
```

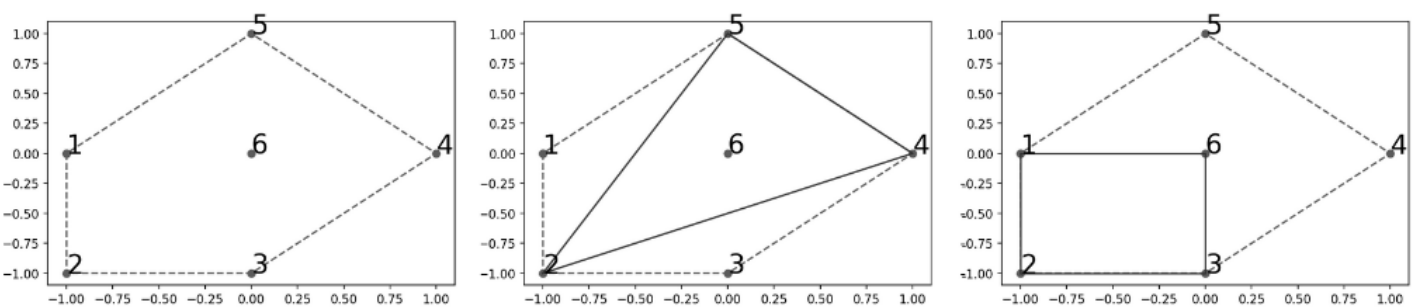
Explanation for Sample Output

As shown in the figure below: the left picture shows the positions of the input 6 clones and the area they occupy; the middle picture shows the situation at the first moment, the numbers of the disappeared clones are $1, 3,$ and 6 respectively, and the remaining 3 points occupy the inner area of the solid line in the picture, which is twice the area of 3; the right picture shows the situation at the second moment, and the numbers of the disappeared clones are respectively

$[(0+3) \bmod 6]+1=4$

$[(1+3) \bmod 6]+1=5$

The remaining 4 points occupy the area inside the solid line in the graph.



Constraints

For all data, it is guaranteed that:

- $|x_i|, |y_i| \le 10^8$;

- No two clones have exactly the same coordinates;
- $k \leq 100$;
- The sum of k at all times does not exceed 2×10^6;
- $0 \leq c_i \leq 2^{31} - 1$;
- Initially, all n clones occupy an area greater than 0;
- The **set of vertices** defining the region occupied by all n clones is S , $|S| \geq 3$. At any moment, there are at least two undisappeared clones in S.

Test Case	$n \leq$	$m \leq$	k
1	10	10	$\leq n-3$
2	10^3	10^3	$\leq n-3$
3	10^3	10^3	$\leq n-3$
4	10^3	10^3	$\leq n-3$
5	10^5	10^5	$=1$
6	10^5	10^5	$=1$
7	10^5	10^5	$=1$
8	10^5	10^5	$=1$
9	10^5	10^5	$=2$
10	10^5	10^5	$=2$
11	10^5	10^5	≤ 3
12	10^5	10^5	≤ 5
13	10^5	10^5	≤ 9
14	10^5	10^5	≤ 12
15	10^5	10^5	≤ 20
16	10^5	10^5	≤ 100
17	10^5	10^5	≤ 100
18	10^5	10^5	≤ 100
19	10^5	10^5	≤ 100
20	10^5	10^5	≤ 100