

7004 Inside, Outside or On

In a 2-D plane, there are n simple polygons. Some polygons may not be convex. Each polygon has at most k vertices. Each vertex is represented as a pair of x and y coordinates. It is known that for each vertex (x, y) , x and y are both non-negative integers that are at most 100,000. Two polygons may have overlaps or even one is inside the other. Given a point $P = (x_p, y_p)$ in the plane, where x_p and y_p are also non-negative integers that are at most 100,000, your task is to decide, for each polygon, whether P is inside or outside the polygon, or on the boundary of it.

Technical Specification

- The number of polygons is bounded by 10, i.e., $0 < n \leq 10$.
- The number of vertices in a polygon is at least 3 and at most 10, i.e., $2 < k \leq 10$.
- Each coordinate in any vertex is at least 0 and at most 100,000.

Input

There are at most 10 test cases. The first line is the number of test cases. For each test case, the first line contains three integers n , x_p and y_p which are the number of polygons, and the x and y coordinates of the point P . The next n lines each contain the number of vertices and the coordinates of the vertices of each polygon in clockwise order. Each vertex is represented by 2 integers separated by a blank. Any two vertices are also separated by a blank.

Output

For each test case, output the relative location of P with respect to each polygon by n numbers. The i -th number is '0' if P is on the boundary of it, is '1' if P is inside, but not on the boundary, of it, and is '2' if it is outside and not on the boundary of it.

Sample Input

```
2
3 10 5
4 2 7 10 8 10 1 1 1
3 9 2 9 10 13 2
4 2 2 2 8 8 3 3 2
1 7 3
5 0 0 5 10 10 5 5 3 10 10
```

Sample Output

```
0 1 2
2
```