

## Problem G

### Augmented Reality

**Time Limit: 2 seconds**

Augmented Reality is the blending of virtual computer-generated media with real physical scenes to enhance user's experience in an immersive environment.

With augmented reality, your smartphone will become an efficient guide to explore a new city. Just turn the camera on, you can see not only the real scene but also icons of attractions displayed on the screen of your smart phone. Furthermore, you can get extra useful data about each attraction, such as distance, rating, etc.



The key idea to create this kind of application is as follows.

The map is defined as a rectangle with its bottom left corner at  $(0, 0)$  and top right corner at  $(10^9, 10^9)$ . You are standing at the point  $A(x_A, y_A)$  and looking at the point  $B(x_B, y_B)$ . The application on the smartphone retrieves the list of  $N$  attractions from the cloud service. Each attraction has its location. Several attractions are in your left side, and you need to turn left to arrive there. Some other attractions are in your right side, and you should turn right if you want to visit any of these attractions. The remaining attractions might appear exactly on the line formed by  $A$  and  $B$ , and you simply go straight forward to reach the chosen destination.

Your task is to quickly answer the number of attractions in your left side, the number of attractions on the line formed by  $A$  and  $B$ , and the number of attractions in your right side.

### Input

The first line of input one integer  $T$  ( $1 \leq T \leq 20$ ) which is number of test cases.

For each test case:

- The first line contains an integer  $N$  ( $1 \leq N \leq 10^4$ ) which is number of attractions.
- From line 2 to line  $N + 1$ , each line contains two integers  $x, y$  representing the coordinate of an attraction ( $0 \leq x, y < 10^9$ )
- Line  $N + 2$  contains an integer  $Q$  ( $1 \leq Q \leq 10^4$ ) which is number of questions.
- From line  $N + 3$  to line  $N + Q + 2$ , each line contains four integers  $x_A, y_A, x_B, y_B$  which means that you are currently standing at point  $(x_A, y_A)$  and looking at the point  $(x_B, y_B)$ .

## Output

For each question, display in a line 3 integers indicating the number of attractions in your left side, the number of attractions on the line formed by  $A$  and  $B$ , and the number of attractions in your right side.

## Notes:

- It is possible that two attractions appearing at the same location.
- There will be no three attractions (with different locations) that appear on the same line.

## Sample Input

## Sample Output

1	4 0 4
8	7 0 1
4 3	
6 7	
6 3	
4 7	
8 5	
8 5	
0 5	
8 5	
2	
2 0 3 1	
3 4 3 1	