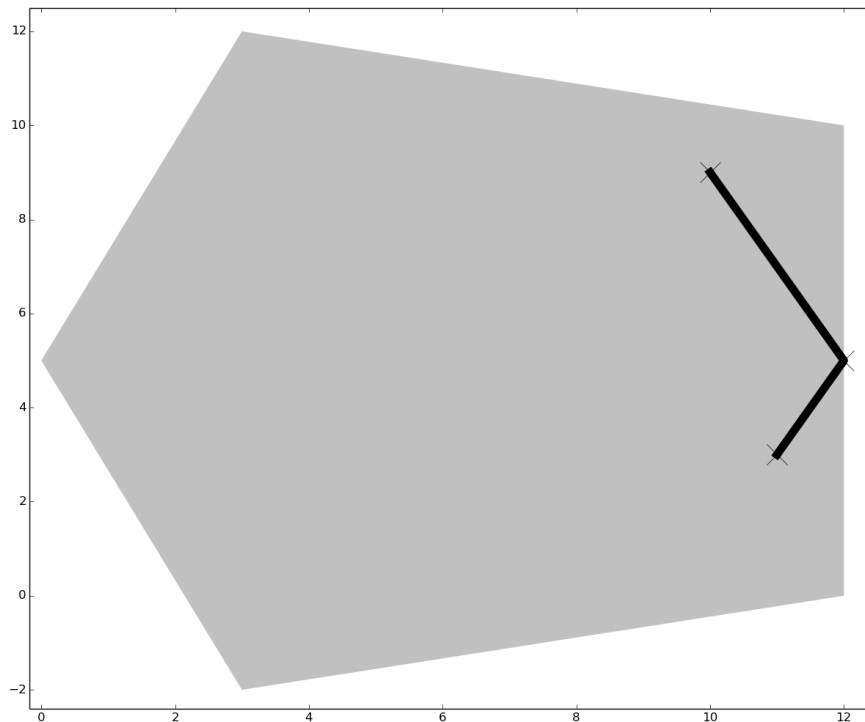

Problem A. Forgot the Flag!

Input file: `flags.in`
Output file: `standard output`
Time limit: 7 seconds
Memory limit: 1024 megabytes

After walking through a lot of people, in order to cheer for the Egyptian team in the World Cup. You finally found your cheering spot in the field of the stadium. The field is shaped like a convex polygon. Then you suddenly remembered that you forgot the Egyptian flag. Since you want to cheer so hard for Egypt, you had to get the flag from any shop on the borders of the stadium (There is a shop on every point on the borders of the stadium), then get back to your spot. Sadly someone took your spot, but since you always have a backup plan, you will go to the second spot you booked. Since all the borders are filled with shops, which shop should you go to in order to minimize the total distance you have to walk from your first spot, to the shop, then to your second spot? You need to answer this question Q times since it happened with a lot of your friends.



Input

The first line of the input consists of a single integer $1 \leq T \leq 50$ the number of test cases. Each test case starts with a line containing a single integer n the number of vertices of the stadium. The following n lines each contains 2 space separated integers x_i, y_i the coordinates of the i -th vertex of the stadium. There are no 3 consequent vertices of the polygon that are collinear. The remaining input of the case starts by a line containing a single integer Q . The following Q lines, each containing 4 space separated integers x_1, y_1, x_2, y_2 , where (x_1, y_1) is your first spot and (x_2, y_2) is the location of your second spot (both not outside the stadium of course). The vertices are given in anti-clockwise order or clockwise order, where $3 \leq n \leq 5 \cdot 10^4$, $1 \leq Q \leq 10$ and all coordinates $|x|, |y| \leq 10^9$.

Output

For each test case output a single line, displaying the case number followed by Q lines each containing 3 space separated decimal numbers rounded to exactly 7 decimal places. The 3 numbers will be on the format ' $d\ x\ y$ ', where d is the shortest distance you will walk in total and (x, y) is the location of the shop on the borders, from which you will pick up the Egyptian flag. If there are multiple shops, output any of them. The output will be checked with a relative error.

Example

flags.in	standard output
1 5 0 5 3 -2 12 0 12 10 3 12 1 10 9 11 3	Case 1: 6.7082039 12.0000000 5.0000000

Note

The first and second spots are not necessarily distinct.