

Scan The Polygon

Input file: **standard input**
Output file: **standard output**
Time limit: 6 seconds
Memory limit: 512 megabytes

You are given a simple polygon, but before giving you the n vertices of the polygon, Little Q has not shuffled them yet, so take it easy.

Little Q will ask n queries, each of which consists of two integers p and q ($0 \leq p/q \leq 1000, 1 \leq q \leq 1000$). For each query, you need to tell him the total length of the points on the line $x = p/q$ that lie inside or on the boundary of the polygon, which can be represented as r/s with two integers r and s ($r \geq 0, s \geq 1, \gcd(r, s) = 1$). Here $\gcd(r, s)$ is the greatest common divisor of r and s .

Input

The first line of the input contains an integer T ($1 \leq T \leq 1000$), indicating the number of test cases. For each test case:

The first line contains an integer n ($3 \leq n \leq 1000$), indicating the number of vertices of the polygon.

Then n lines follow, each containing two integers x and y ($0 \leq x, y \leq 1000$) that give the coordinates (x, y) of the vertices of the polygon in counter-clockwise order.

The polygon is simple, i.e., its vertices are distinct and no two edges of the polygon intersect or touch, except that consecutive edges touch at their common vertex. In addition, no two consecutive edges are collinear.

It is guaranteed that the sum of n for all test cases does not exceed 1000.

Output

For each query, output a line containing two integers r and s ($r \geq 0, s \geq 1, \gcd(r, s) = 1$), indicating the answer to the query.

Example

standard input	standard output
2	0 1
4	2 1
0 0	1 1
1 1	0 1
3 0	1999 999000
1 3	1999 2000
0 1	0 1
1 1	
2 1	
3 1	
3	
0 0	
1000 999	
999 1000	
1 1	
1999 2	
1000000 1000	