

## Problem 4 - Painting (painting)

Having Reply's offices empty in recent months has been an excellent opportunity to renovate them.

To mark the occasion, R-Boy wants to repaint, in a geometric way, the main wall of the Solar Office that, for the purpose of this problem, is an infinite two-dimensional space where the origin is in the centre of the wall itself.

You are given a set of  $N$  lines, represented by the values  $m$  and  $q$  (to indicate the line  $y = m \times x + q$ ). For each line, consider the half-plane in the direction of the origin. R-Boy wants to paint the area where all the half-planes intersect.

Write a program to help R-Boy find the total area to cover, so he can buy the correct amount of paint.

### Input data

The first line of the input file contains an integer  $T$ , the number of test cases to solve, followed by  $T$  testcases, numbered from  $1$  to  $T$ .

In each test case, the first line contains the integer  $N$ : the number of lines in the grid.

The next  $N$  lines contains 2 space-separated real numbers each: the values  $m[i]$  and  $q[i]$  of the  $i^{th}$  line.

### Output data

The output file must contain  $t$  lines. For each test case in the input file, the output file must contain a line with the words:

**Case # $t$ : a**

where  $t$  is the test case number (from  $1$  to  $T$ ) and  $a$  is the real value of the surface required to be painted (with a maximum relative error of  $10^{-6}$  with respect to the official solution) or the string *inf* if the total surface is infinite.

### Constraints

- $1 \leq T \leq 15$ .
- $1 \leq N \leq 100\,000$ .
- $q[i] \neq 0$ , for  $i = 0 \dots N - 1$ .
- All the pairs  $(m[i], q[i])$  are distinct.
- The total area, if finite, can fit a in a 32-bit floating point number.

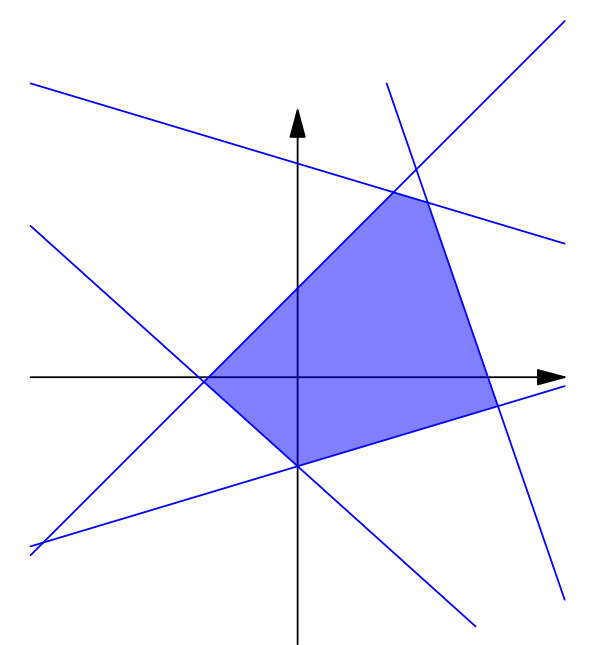
### Scoring

- **input 1** :  $T = 5$ , there are, at maximum, 2 distinct values of  $m[i]$ .
- **input 2** :  $T = 5$ ,  $N \leq 20$ .
- **input 3** :  $T = 10$  and  $N \leq 250$ .
- **input 4** :  $T = 15$  and  $N \leq 5\,000$ .
- **input 5** :  $T = 15$  and  $N \leq 100\,000$ .

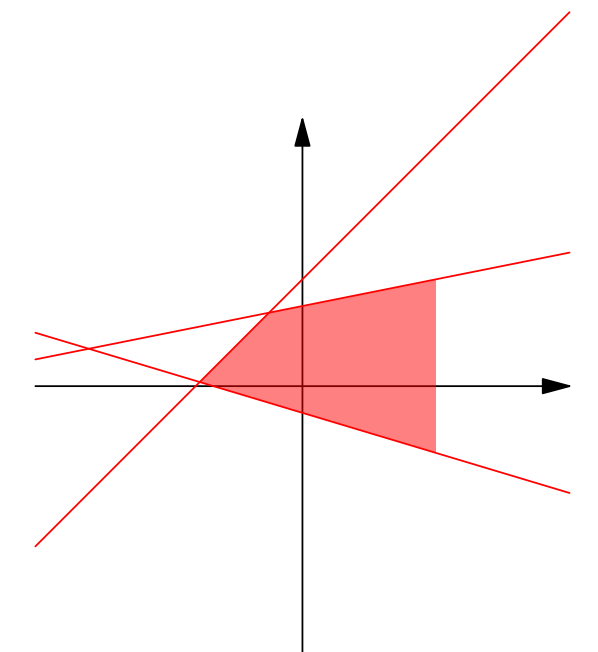
Examples

input	output
2 5 1.0 1.0 -0.3 2.4 -2.9 6.2 0.3 -1.0 -0.9 -1.0 3 -0.3 -0.2 1.0 0.8 0.2 0.6	Case #1: 5.62186234 Case #2: inf

Explanation



In the first example the surface is limited by the pentagon in the figure.



In the second example the covered area is infinite.