Cake Splitting

Problem ID: cake

Quora is celebrating the launch of new subscriptions options for creators. The company ordered a huge cake for everyone to enjoy. The cake is in a shape of convex polygon represented by n points in the coordinate system. There are m employees in the celebration. Each employee will come in order, split the cake with a line, and take the piece with smaller area. Assume an employee doesn't want cake if their line doesn't intersect with the cake.

What is the remaining area of the cake after the celebration?

Note: It is guaranteed that both the absolute and relative area difference of the two pieces after each split are more than 10^{-6}.

Input

Your program will receive input from standard input.

The first line contains two space-separated positive integers n and m, representing the number of edges of the cake, and the number of employees in the celebration.

In the following n lines, the i-th line contains two real numbers containing up to 12 decimal points x_i and y_i representing the location of the ith point. The points will be given in counter-clockwise order around the cake.

In the following m lines, the i-th line contains four space-separated real numbers containing up to 12 decimal points $x_{1i}, y_{1i}, x_{2i}, y_{2i}$ representing that the line of the i-th employee will pass through (x_{1i}, y_{1i}) and (x_{2i}, y_{2i}).

Output

Your program should write to standard output.

Print exactly one line containing a number representing the area of the remaining part of the cake. The answer will be considered correct if the absolute or relative difference is no more than 10^{-6}.

Constraints

- $3 \leq n \leq 10^5$
- $1 \leq m \leq 10^5$
- $-10^6 \leq x_i, y_i \leq 10^6$

Subtasks

You will get points for each subtask when you pass all of the testcases of the subtask.

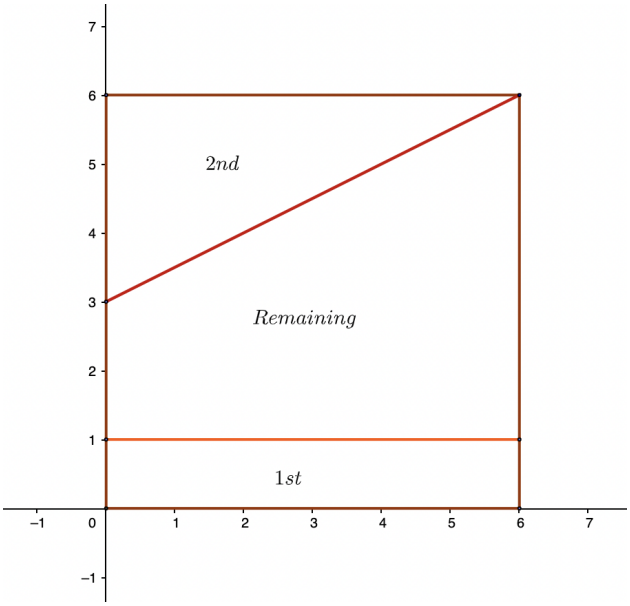
1. $n, m \leq 10^3$ (34 points)
2. No additional constraints (66 points)

Sample Explanation

In Sample Input 1, the cake consists of 4 corners and there are 2 employees.

- The first employee cuts the bottom part.
- The second employee cuts the the cake from left to top right corner, and takes the smaller part.

The cuts are shown below:



The remaining part of the cake has corners (0, 1), (0, 3), (6, 6), and (6, 0) and has area 21.

Sample Input 1	Sample Output 1
4 2 0.000000 0.000000 6.000000 0.000000 6.000000 6.000000 0.000000 6.000000 0.000000 1.000000 1.000000 1.000000 2.000000 4.000000 4.000000 5.000000	21.000000