

Gas Stations

Input file: *standard input*
Output file: *standard output*
Time limit: 10 seconds
Memory limit: 2048 MB

You are on a beautiful island that looks like a grid in the Cartesian x-y plane. There are N gas stations at integer coordinates. You are in a car that can travel along the coordinate axes, i.e. horizontally or vertically. Diagonal movement is not allowed. The car has a fuel tank capacity that allows travelling up to distance D . When you are at a coordinate that also has a gas station that is open, you may fill up your fuel tank.

You are given Q hypothetical queries of the following form: you start from gas station A and you want to reach gas station B . There is exactly one gas station apart from A and B , uniformly at random, which is closed. All other gas stations are open. What is the probability of success of reaching gas station B ?

Input

The first line of the input contains 3 integers: the number of gas stations N ($3 \leq N \leq 10^5$), the maximum distance D ($1 \leq D \leq 10^8$), and the number of queries Q ($1 \leq Q \leq 10^5$).

The next N lines contain 2 integers each, x_i and y_i ($-10^8 \leq x_i, y_i \leq 10^8$, for $0 \leq i < N$) denoting the coordinates of the gas stations.

The next Q lines contain 2 integers each, a_i and b_i ($0 \leq a_i, b_i < N$ and $a_i \neq b_i$) denoting the queries.

Output

The output should contain Q lines denoting the probability of success for each hypothetical query.

Your answer is considered correct if the absolute error does not exceed 10^{-7} .

Example

standard input	standard output
7 2 2	0.6
1 1	1
3 1	
2 2	
1 3	
1 5	
3 5	
5 3	
1 5	
1 3	

For the first query, we start from gas station 1 and need to reach gas station 5. The following have probability $\frac{1}{5}$ each, giving a total success probability of $\frac{3}{5}$:

- Gas station 0 is closed. We can complete our journey by filling our tank in each of the following gas stations $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$
- Gas station 2 is closed. We can complete our journey by filling our tank in each of the following gas stations $1 \rightarrow 0 \rightarrow 3 \rightarrow 4 \rightarrow 5$
- Gas station 3 is closed. We cannot complete our journey
- Gas station 4 is closed. We cannot complete our journey
- Gas station 6 is closed. We can complete our journey by filling our tank in each of the following gas stations $1 \rightarrow 0 \rightarrow 3 \rightarrow 4 \rightarrow 5$