Two Convex Holes

Input file: `standard input`
Output file: `standard output`
Time limit: 5 seconds
Memory limit: 1024 megabytes

Consider two opaque planes $z = z_1$ and $z = z_2$ ($z_1 < z_2$) in a three-dimensional Cartesian coordinate system. Each plane has a convex polygonal hole, denoted as P_1 and P_2 respectively, which allows light to pass through.

There is a point light source L moving in the plane $z = z_0$ ($z_2 < z_0$), in a direction parallel to the xOy plane. The light source starts at the initial position (x_0, y_0, z_0) at time $t = 0$ and moves with a constant velocity $\boldsymbol{v} = (v_x, v_y, 0)$. Therefore, at any time t, the position of the light source is given by $(x_0 + v_x t, y_0 + v_y t, z_0)$.

For a point A in the plane $z = 0$, define it as **illuminated** at time t if and only if the segment LA intersects the interiors (including boundaries) of both polygons P_1 and P_2. The **illuminated area** at time t, denoted as $f(t)$, is the area formed by all illuminated points in the plane $z = 0$.

Define the **average illuminated area** over the time period $[t_1, t_2]$, denoted as $\mathbb{E}[f(t)|t \sim U(t_1, t_2)]$, as the expected value of $f(t)$ over the interval $[t_1, t_2]$, assuming t is a uniformly distributed random variable over $[t_1, t_2]$.

Given multiple time periods $[t_1, t_2]$, your task is to find the average illuminated area for each of these periods.

Input

The first line contains a single integer T ($1 \le T \le 10^4$) indicating the number of test cases.

For each test case, the first line contains five integers x_0, y_0, z_0, v_x, v_y ($-10^5 \le x_0, y_0 \le 10^5$, $1 \le z_0 \le 10^5$, $-10^3 \le v_x, v_y \le 10^3$), representing the initial position of the light source (x_0, y_0, z_0) and its velocity vector $\boldsymbol{v} = (v_x, v_y, 0)$. It is guaranteed that $\boldsymbol{v} \ne (0, 0, 0)$.

The second line contains two integers n_1 and z_1 ($3 \le n_1 \le 10^5$, $1 \le z_1 \le 10^5$), indicating the number of vertices of polygon P_1 and the value of z_1. Each of the following n_1 lines contains two integers x_i and y_i ($-10^5 \le x_i, y_i \le 10^5$), describing the vertices of P_1 in counterclockwise order.

The following line contains two integers n_2 and z_2 ($3 \le n_2 \le 10^5$, $1 \le z_2 \le 10^5$), indicating the number of vertices of polygon P_2 and the value of z_2. Each of the following n_2 lines contains two integers x_j and y_j ($-10^5 \le x_j, y_j \le 10^5$), describing the vertices of polygon P_2 in counterclockwise order.

It is guaranteed that no three or more vertices are collinear for P_1 and P_2.

The following line contains an integer q ($1 \le q \le 10^5$), indicating the number of queries. Each of the following q lines contains two integers t_1 and t_2 ($0 \le t_1 \le t_2 \le 10^3$), representing a time period.

It is guaranteed that the sum of $n_1 + n_2$ and the sum of q over all test cases do not exceed 10^5, respectively, and $z_1 < z_2 < z_0$.

Output

For each query, output a real number representing the average illuminated area. Your answer will be considered correct only if the relative or absolute error between your answer and the correct answer does not exceed 10^{-4}.

Example

standard input	standard output
1 0 0 3 0 -1 4 1 1 0 3 0 3 2 1 2 4 2 0 0 1 0 1 1 0 1 3 0 10 1 2 1 1	0.450000000 1.125000000 2.250000000

Note

For the example, the projections of convex polygons P_1 and P_2 onto the xOy plane at $t = 0$, and the movement of these projections, are illustrated below. Polygon $A_1B_1C_1D_1$ is the projection of polygon P_1, and polygon $A_2B_2C_2D_2$ is the projection of polygon P_2.