Approaching Hurricane

Aroma lives on an island in the middle of the sea. It's hurricane season and Aroma needs to lead the clean up efforts after each hurricane, so she wants to know the area of the affected region in each hurricane beforehand.

To do so, Aroma has modeled the island as a **simple** polygon that has n vertices and n edges. The polygon may not be convex, but it is not self-intersecting.

There are q upcoming hurricanes. Each hurricane has the form of a *moving* circle with changing radius. Here is how Aroma formally models the hurricane:

- The hurricane is modeled as a circle, with its center representing the eye of the hurricane, and the radius of the circle representing the effective range.
- The hurricane will appear with center at point (x_s, y_s) and a radius of r_s.
- The hurricane's center will gradually move from (x_s, y_s) to (x_t, y_t) **in a straight line**, and its radius also changes gradually from r_s to r_t.

  Formally, at some moment, if the distance between the hurricane's current center and (x_s, y_s) is d_s, and the distance between that and (x_t, y_t) is d_t; then the hurricane's current radius is

$$\frac{d_s \cdot r_t + d_t \cdot r_s}{d_s + d_t}$$

- When the hurricane's center reaches the point (x_t, y_t), it stays there until it dissipates.

If at any moment, a point P on the island is within the circle representing the i-th hurricane, then P is said to be **affected** by this hurricane.

After modeling, Aroma wants to determine the **affected** land area for each hurricane so she can devise a helping plan. Please help Aroma find the area of **affected** land for each hurricane passing by.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 10^4$). The description of the test cases follows.

- The first line contains a single integer n ($3 \le n \le 3 \cdot 10^5$) – the number of points that make up the island.
- The i-th of the next n lines contains two integers x_i and y_i– ($|x_i|, |y_i| \le 5000$) – the coordinates of the i-th vertex of the polygon that represents the island.
- The next line contains an integer q ($1 \le q \le \min\left\{3 \cdot 10^5, \frac{10^6}{n}\right\}$) – the number of upcoming hurricanes.
- The i-th of the next q lines contains six integers $x_s, y_s, r_s, x_t, y_t, r_t$ ($|x_s|, |y_s|, |x_t|, |y_t| \le 5000$, $1 \le r_s, r_t \le 100$) – representing the i-th hurricane.

It is guaranteed that:

- vertices are listed in either clockwise or counterclockwise order,

- no two given vertices of the polygon have the same coordinates,
- two edges of the polygon only intersect at their shared end vertex (if any),
- the sum of $n \cdot q$ over all t test cases does not exceed 10^6.

Output

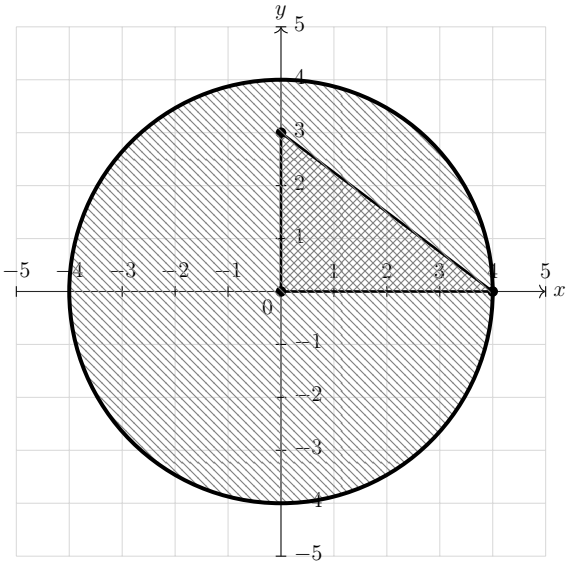
For each of the hurricanes, print the affected area of the island. Your answer is considered correct if its absolute or relative error does not exceed 10^{-6}.

Formally, let your answer be a, and the jury's answer be b. Your answer is accepted if and only if $\frac{|a-b|}{\max(1,|b|)} \leq 10^{-6}$.

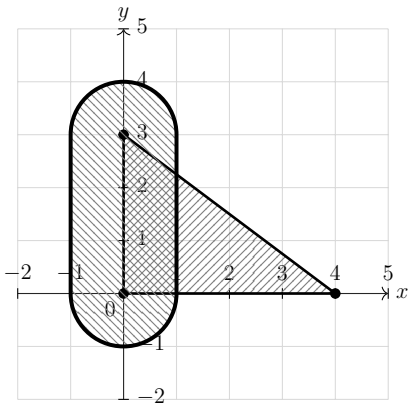
Sample Input 1	Sample Output 1
3 3 0 0 0 3 4 0 5 0 0 4 0 0 4 0 0 1 0 3 1 0 0 2 4 0 2 1 1 1 5 5 5 -1 -1 1 3 3 3 5 0 0 1 1 2 2 2 0 2 -2 1 2 0 1 6 0 2 3 3 3 2 1 1 1 1 2 2 1 2 2 1	6.000000000000 2.625000000000 5.333333333333 5.785398163397 5.982317997582 1.576314961400 0.863647609001

Sample Explanation

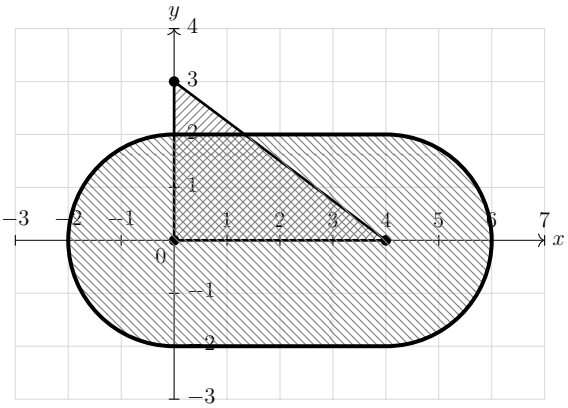
Below are the illustrations for the first test case. The triangle represents the island.



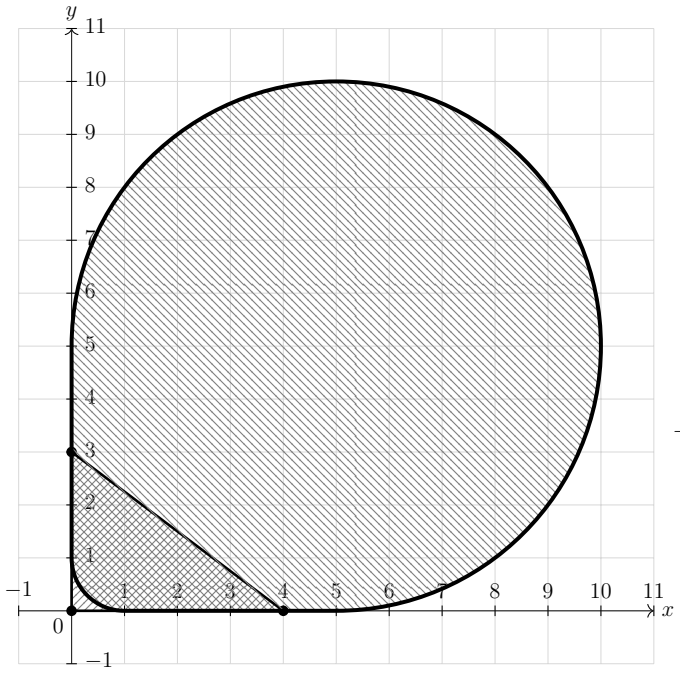
Query 1



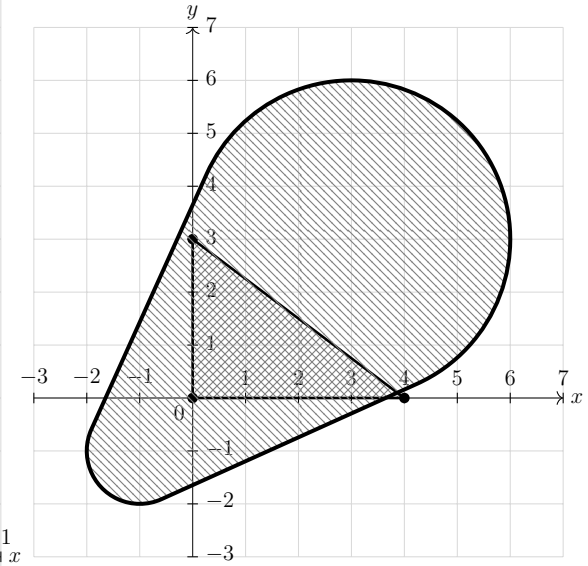
Query 2



Query 3

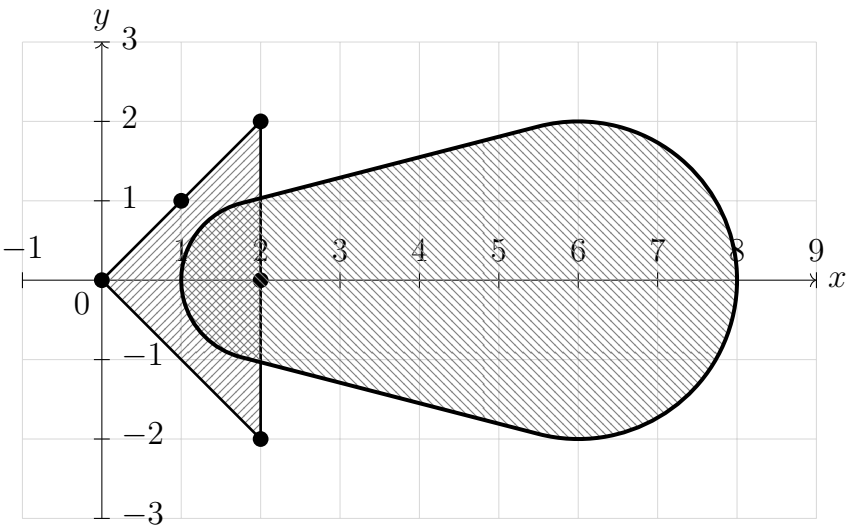


Query 4



Query 5

The following are the illustrations for the second test case.



The following are the illustrations for the third test case.