Problem B: Frog on a Log

Filename: `frogonalog`

Time limit: `1 second`

Maria is a frog and she's currently on a lily pad. Unfortunately, the lily pad is sinking and she'll be eaten by the alligator in the water if she doesn't jump off of it soon. Luckily, there are several logs that are floating nearby. If she can jump to any one of them, she'll be far enough off the water that the alligator can't get her. Of course, because this is a competitive programming problem, Maria is lazy and she would like to jump the least distance possible while still saving herself.

For the purposes of this problem treat Maria's initial position (lily pad) as a point on the Cartesian plane and each of the logs as line segments on the Cartesian plane.

The Problem

Given a point, **p**, and several line segments on the Cartesian plane, determine the shortest distance from **p** to any point on any of the line segments.

The Input

The first line contains an integer **c**, the number of test cases. The test cases follow, one per line. The first line of each test case will contain two space separated integers, **x** and **y**, representing the position of Maria's lily pad. The second line of each test case will contain a single positive integer, **n**, representing the number of logs in the surrounding area. The following **n** lines will each contain a four of space separated integers, $\mathbf{x_1}$, $\mathbf{y_1}$, and $\mathbf{x_2}$, $\mathbf{y_2}$, representing that there is a log (straight line segment) from ($\mathbf{x_1}$, $\mathbf{y_1}$) to ($\mathbf{x_2}$, $\mathbf{y_2}$). It is guaranteed that the point (**x**, **y**) will not be contained on any of the line segments and that none of the line segments will intersect.

The Output

For each test case, output a single floating point number: the shortest distance from the point (**x**, **y**) to any point on any of the line segments representing the logs. Your answer will be accepted as long as it's within an absolute or relative error of 10^{-6}.

Input Bounds and Corresponding Credit

20 Points	80 Points
• $1 \le \mathbf{c} \le 10$ • $1 \le \mathbf{n} \le 5$ • $\mathbf{y_1} = \mathbf{y_2}$ • $-10^4 \le \mathbf{x}, \mathbf{y}, \mathbf{x_1}, \mathbf{y_1}, \mathbf{x_2}, \mathbf{y_2} \le 10^4$	• $1 \le \mathbf{c} \le 20$ • $1 \le \mathbf{n} \le 100$ • $-10^4 \le \mathbf{x}, \mathbf{y}, \mathbf{x_1}, \mathbf{y_1}, \mathbf{x_2}, \mathbf{y_2} \le 10^4$

Samples

Input	Output
2 0 0 3 10 10 20 10 -8 -6 100 -6 -15 30 -5 30 -5 5 1 -50 -50 -1 -1	6 7.211102550927978

Sample Explanation and Note: The first input case in the sample adheres to the rules of the small data. The closest point on the three logs that the frog can jump to is (0, -6). Note that the second sample **does not** adhere to the rules of the small data specification. In this particular case, Maria should jump from (-5, 5) to (-1, -1) which is a distance of sqrt(4^2 + 6^2) = sqrt(52).