Minimum Manhattan Distance

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 64 megabytes

Recall that on a two-dimensional plane, the Manhattan distance between two points (x_1, y_1) and (x_2, y_2) is $|x_1 - x_2| + |y_1 - y_2|$. If both coordinates of a point are all integers, then we call this point an integer point.

Given two circles C_1, C_2 on the two-dimensional plane, and guaranteed the x-coordinates of any point in C_1 and any point in C_2 are different, and the y-coordinates of any point in C_1 and any point in C_2 are different.

Each circle is described by two integer points, and the segment connecting the two points represents a diameter of the circle.

Now you need to pick a point (x_0, y_0) inside or on the C_2 such that minimize the expected value of the Manhattan distance from (x_0, y_0) to a point inside C_1 , if we choose this point with uniformly probability among all the points with a real number coordinate inside C_1.

Input

The first line contains a single integer t $(1 \le t \le 10^5)$, representing the number of test cases.

Then follow the descriptions of each test case.

The first line contains 4 integers $x_{1,1}, y_{1,1}, x_{1,2}, y_{1,2}$, representing the segment connecting $(x_{1,1}, y_{1,1})$ and $(x_{1,2}, y_{1,2})$ is a diameter of the circle C_1.

The second line contains 4 integers $x_{2,1}, y_{2,1}, x_{2,2}, y_{2,2}$, representing the segment connecting $(x_{2,1}, y_{2,1})$ and $(x_{2,2}, y_{2,2})$ is a diameter of the circle C_2.

All the coordinates input are integers in the range $[-10^5, 10^5]$.

Output

For each test case, output a single line with a real number - the minimum expected Manhattan distance. Your answer will be considered correct if its absolute or relative error does not exceed 10^{-6}. That is, if your answer is a, and the jury's answer is b, then the solution will be accepted if $\frac{|a-b|}{\max(1,|b|)} \le 10^{-6}$.

Example

standard input	standard output
1 0 0 2 1 4 5 5 2	4.2639320225