Frogger II

(You will have less restriction on time for this problem)

Poor little Frogger. Tried crossing a simple road, but couldn't make it in time... Moment of silence, please....

But don't worry, everything is just fine! Now he is up in the clouds as "Ghost Frogger," and he is doing what he loves most: crossing things. He wants to cross clouds, from one side of the plane to the other. He prefers stationary clouds over any others, since he can relax in the sun. They only last a small amount of time though, so he has to travel between clouds very often, and as quickly as possible. Non-stationary clouds can come and go in any direction, and this is exactly how he got up here in the first place. Can you help Ghost Frogger survive the cloud level?

Input

Input begins with a single number, *T*, the number of times Ghost Frogger has to travel between clouds. Each trip will begin with a single integer *C (*$C \leq 2{,}500$*)*, the number of clouds Ghost Frogger can travel on. Each cloud will be represented on a single line as a rectangle of four pairs of integer points in clockwise order (starting from the top left corner), plus a single integer that will denote the cloud's direction. The direction will be 0 if the cloud is stationary, or an integer between 1 and 360, which is the degree-based angle that the cloud is traveling (where 360° is in the positive x direction, and 90° is in the positive y direction). Ghost Frogger can travel between any two clouds as long as at least a single point is touching both clouds, and as long as he is on one of those clouds at the time they are touching. Finally, there will be two more clouds, denoting the cloud Ghost Frogger is on, and the one he wants to reach, which will both have 0's as their direction. Clouds always travel at 1 unit per second, and Ghost Frogger can travel between two clouds instantaneously. All coordinates will have a magnitude no greater than 100000.

Output

For each trip, output a single floating point number, the number of seconds it will take for Ghost Frogger to get from his current cloud to his target cloud, rounded to 4 decimal places. If Ghost Frogger has no way to reach his target cloud, then output -1. It will never take Ghost Frogger more than 1000 seconds to reach his target.

Sample Input

```
3
1
0 1 1 1 1 0 0 0 0
0 0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1 0
2
0 2 1 2 1 1 0 1 90
6 3 7 3 7 2 6 2 270
1 1 2 1 2 0 1 0 0
6 3 7 3 7 2 6 2 0
2
-2 -1 -1 -1 -1 -2 -2 -2 45
0 -4 3 -4 3 -6 0 -6 90
0 1 1 1 1 0 0 0 0
2 3 3 3 3 2 2 2 0
```

Sample Output

```
0.0000
-1
4.2426
```