

Problem L

Teacups

Time limit: 5 seconds

Orlando, USA

All the HSPC volunteers and participants are going to Bisneyworld in Florida to celebrate! They've decided to go on the spinning teacups ride—they love going around and around in circles. But the volunteers realized the participants don't have the problem packets, and so they need to throw it to them on the rides. Can you help them figure out how close they can get to each other so they can deliver the packets?

These rides work by having disks (possibly on other disks). You can get two students closer by rotating disks—when you rotate a disk, all disks and points on inside the disk rotate about the center of the disk as well (see figures L.1 and L.2).

It is guaranteed that the boundaries (i.e. the circles) of the disks do not intersect or touch each other. However, disks could be fully contained in other disks. There are no students on the boundaries of disks (for safety reasons).

You (the ride operator) will respond to queries asking how close you can get two students to each other.

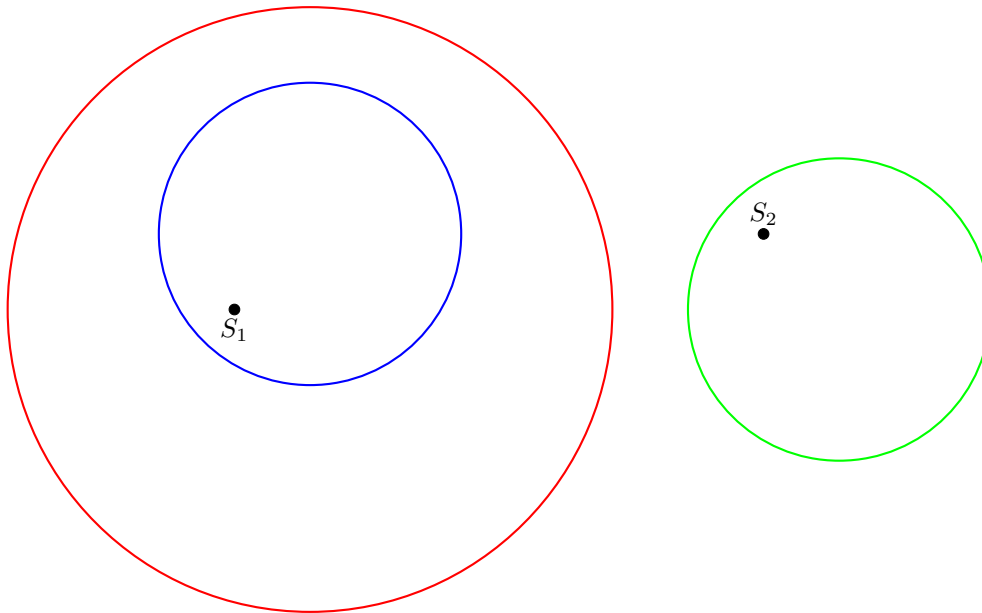


Figure L.1: Original

Input

The first line contains two integers T, S ($1 \leq T \leq 10^5$, $2 \leq S \leq 10^5$), where T is the number of rotating teacups, and S is the number of students.

Each of the next T lines contains three space-separated integers x, y ($-10^7 \leq x, y \leq 10^7$) and r ($1 \leq r \leq 10^7$), which describes a teacup with center (x, y) and radius r .

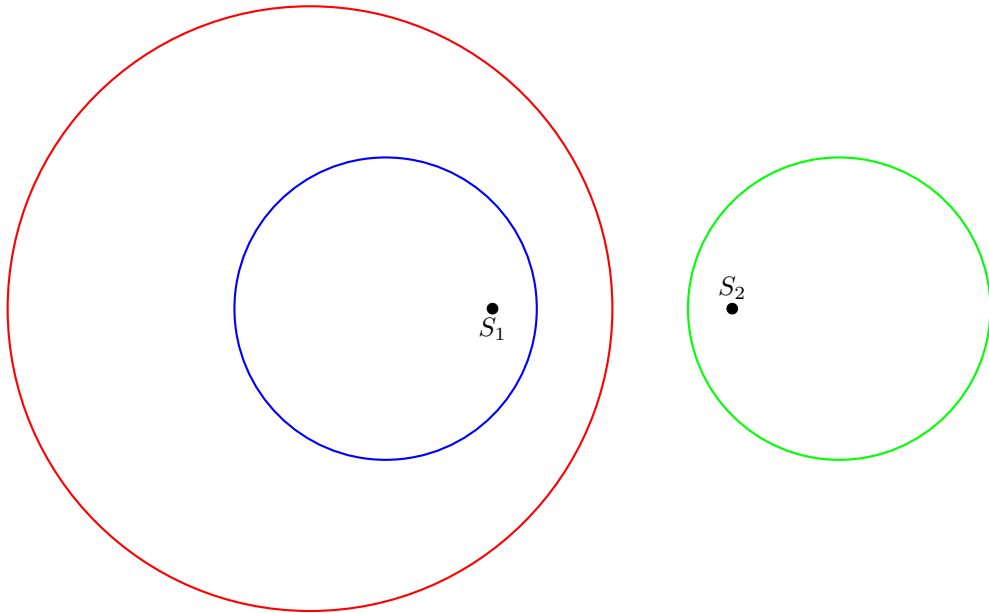


Figure L.2: After rotation optimal for S_1 and S_2

Each of the next S lines contains two space-separated integers x_i, y_i ($-10^7 \leq x_i, y_i \leq 10^7$), where the i^{th} of these lines ($1 \leq i \leq S$) has the location (x_i, y_i) of the i^{th} student at the beginning.

The next line contains one integer Q ($1 \leq Q \leq 10^5$) which describes the number of queries.

Each of the next Q lines contains two space-separated integers i, j ($1 \leq i, j \leq S$ and $i \neq j$). This represents the pair of students that we are trying to minimize the distance for.

Output

For each query output a line with a single value, which is the minimum possible distance between the students in the query. Your answer will be accepted if the absolute or relative error is at most 10^{-6} . That is, if the correct answer is y and your answer is x , your answer will be accepted if $\min\left(|x - y|, \frac{|x - y|}{y}\right) \leq 10^{-6}$.

Sample Input 1

```
3 2
0 0 4
0 1 2
7 0 2
6 1
-1 0
1
1 2
```

Sample Output 1

```
3.17157287525
```