Faster than a Speeding Bullet

`bullet.java, bullet.c, bullet.C`

Superman has at least two powers that normal mortals do not possess, namely, x-ray vision and the ability to fly faster than a speeding bullet. Some of his other skills are not so impressive: you or I could probably change clothes in a telephone booth if we put our minds to it.

Superman seeks to demonstrate his powers between his current position $s = (x_s, y_s)$ and a target position $t = (x_t, y_t)$. The environment is filled with circular (or cylindrical) obstacles. Supermans x-ray vision does not have unlimited range, being bounded by the amount of material he has to see through. He is eager to compute the total obstacle intersection length between the two points to know whether to attempt this trick.

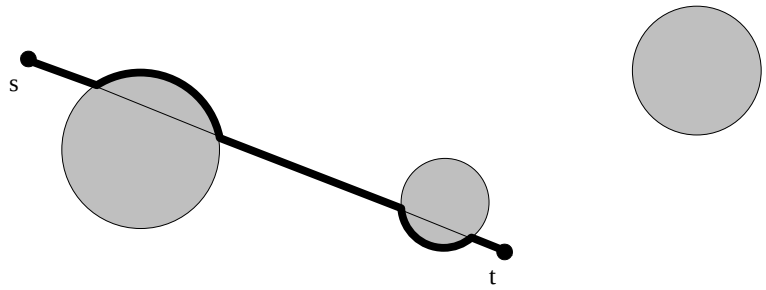

Figure: Supermans flight plan, with associated x-ray thickness.

Failing this, the Man of Steel would like to fly between his current position and the target. He can see through objects, but not fly through them. His desired path flies straight to the goal, until it bumps into an object. At this point, he flies along the boundary of the circle until he returns to the straight line linking position to his start and end positions. This is not the shortest obstacle-free path, but Superman is not completely stupid he always takes the shorter of the two arcs around the circle.

You may assume that none of the circular obstacles intersect each other, and that both the start and target positions lie outside of obstacles.

Input

The input contains several problem descriptions. Each problem starts with a line containing a single integer number N, $0 \leq N \leq 1000$, giving the number of circular obstacles. Then there are N lines, each containing three integer numbers x_i, y_i, and r_i, giving the coordinates and radius of the i-th obstacle. The last two lines of a problem description contain two integer numbers each, giving x_s, y_s, x_t, and y_t.

All radii and absolute values of coordinates will not exceed 10 000. The last description is followed by a line containing -1.

Output

For each problem description, output the sentence `Superman sees thru` E `units, and flies` F `units.` E is the total length of x-ray vision that must pass through the obstacles, F is the length of the flight path. Round the number to exactly two decimal places.

Sample Input

```
1
20 20 10
0 20
50 20
1
20 20 10
0 0
50 0
-1
```

Sample Output

```
Superman sees thru 20.00 units, and flies 61.42 units.
Superman sees thru 0.00 units, and flies 50.00 units.
```