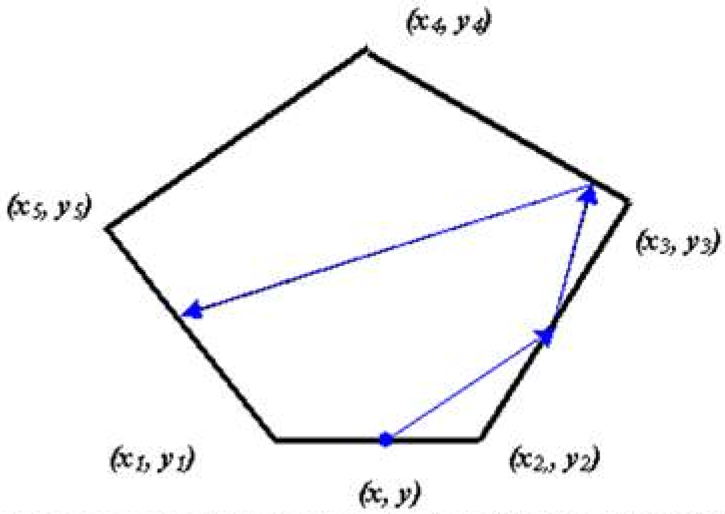
Suppose we have a convex polygon of n vertices. One of the edges have a light emitting point which emits a ray of light in a known direction. The edges of the polygon are made of mirrors. As a result when a ray falls upon an edge, it is reflected to another directon according to the laws of reflection. So after a certain number of reflections we can evaluate the point hitted by the ray. Our challenge here is to evaluate that point. By the way, if the ray falls upon a vertex of the polygon, it is lost forever.



(figure : showing a ray starting from (x, y) and ending after 2 reflections)

The figure may not show the angles properly. But in actual cases, I mean in your program, you should follow the rules of reflection.

Input

The input session begins with two numbers $3 \leq v \leq 10$, $0 \leq n \leq 1000$, denoting the number of vertices in the polygon and the number of reflections to simulate. After that a line will follow containing (x, y), the position of the light emitting point, which will always lie upon an edge (and will never coincide with any vertex) and $0 \leq t < 360$, the angle in degree between x-axis and the ray, measured in anti-clockwise direction, which is always valid. Next there will be v lines each of which will contain a vertex of the polygon ordered to the anti-clockwise direction. All points will be represented in x, y coordinate system with two digits after the decimal point. A pair of zeros declares the end of the input session.

Output

For every dataset, output the final point the ray hits after n reflections with two digits after the decimal point. Remember, the point should lie upon an edge of the polygon. If the ray is lost forever within n reflections, output '`lost forever...`'. Output for every dataset should start in a new line.

Be extra cautious about precision errors. Because if there is a vertex 4.00 and our ray passes through 4.001, we will count it as '`lost forever...`', as we are concerned with only two digits after the decimal point.

Sample Input

```
4 4
2.00 0.00 0.00
0.00 0.00
4.00 0.00
4.00 4.00
0.00 4.00
4 0
2.00 0.00 45.00
0.00 0.00
4.00 0.00
4.00 4.00
0.00 4.00
0 0
```

Sample Output

```
lost forever...
4.00 2.00
```