

11177 Fighting against a Polygonal Monster

You're fighting against a monster. You have a special weapon that can shoot a laser beam. The laser beam can be seen as a cylinder along the z -axis, So when look from above the XY plane, the laser beam is actually a circle centered at $(0,0)$ (yes, you cannot change the position of center). The monster is a convex polygon (well, you may think of it as a very thin prism) with n vertices surrounding the origin (i.e. $(0,0)$ is strictly inside the monster, not on his boundary).

You know that, when the common area of the laser beam and the monster is at least R , the monster dies. Since larger laser beam consumes more power, you're interested in the minimum radius of the laser beam.

Write a program to find the minimum radius. It is guaranteed that $(0 \leq R \leq A)$, where A is the area of the monster.

Input

The input consists at most 10 cases. Each case starts with a single integer n ($3 \leq n \leq 50$) and a floating-point number R followed by n lines of two real numbers: the coordinates of the monster. The points are arranged in counter-clockwise order or clockwise order. The last test case is followed by a single zero, which should not be processed. The meaning of N and R are given in the problem statement.

Output

For each test case, print the case number and the minimum radius, to 2 decimal places. Inputs will be such that small precision errors will not change the visible output if you use double-precision floating-point numbers.

Sample Input

```
3 1.60
-1 -1
1 -1
0 1
0
```

Sample Output

```
Case 1: 0.93
```