Given a convex polygon in 2D space, you're to find out the farthest vertex for each vertex.

Input

There will be at most 10 test cases in the input. Each test case begins with a single integer n ($3 \leq n \leq 30,000$), the number of points. Each of the following n lines contains two integers x, y ($0 \leq x, y \leq 100,000,000$), the coordinates of the vertices, in counter-clockwise order. The last test case is followed by a line with $n = 0$, which should not be processed.

Output

For each test case, print n lines, the farthest vertices for each vertex. The vertices in the input are numbered 1 to n. If there are multiple farthest vertex, output the smallest index.

Sample Input

```
3
0 0
1 0
0 10
0
```

Sample Output

```
3
3
2
```