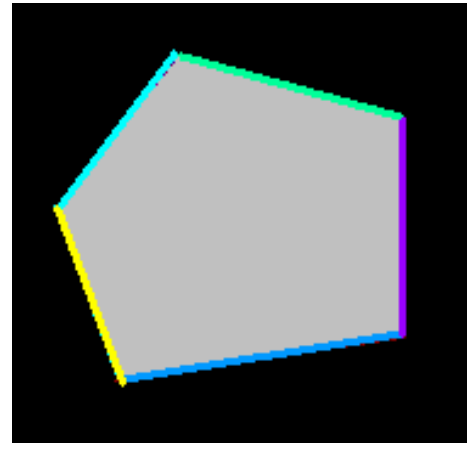
Mr. Picasso is a geometry expert. Recently he invented a method of drawing polygon. He starts with a point and draw a line segment from the end point of the previous line segment in such a way so that except adjacent segments no two segments intersect. He finishes drawing when he returns to the starting point. Such a polygon is shown in the following figure.



In this problem you have to find the minimum and maximum angle of Picasso's polygon.

Input

Each input starts with an integer, N ($3 \leq N \leq 20$). In the following N lines there are two integers indicating the Cartesian coordinate of the end points of line segments drawn by Picasso. The absolute value of each co-ordinate will not cross 1000. Input is terminated when N is less than 3.

Output

For each line of input print the value of minimum and maximum angles of Picasso's Polygon in degree. Use 6 digits precision.

Sample Input

```
3
0 0
10 0
0 10
4
0 0
10 0
10 10
0 10
0
```

Sample Output

```
45.000000 90.000000
90.000000 90.000000
```