4940 Triangular Redistricting

The time has come for Triangle City to re-draw the city council district boundaries. Triangle City is so named because the city limits form a triangle. The city is not large (its population varies, but has never exceeded 30,000), so the city council has only three members. Fortunately, the population of the city is a multiple of three.

The last redistricting was very political and resulted in gerrymandered districts. In order to prevent that from happening again, the city charter now requires that the three districts not only contain the same number of people, but that they be split on a single point. The district boundaries will be formed by connecting the splitting point to each vertex of the boundary triangle, resulting in three triangular council districts.

Your team is to write a program that, given the boundaries of the city and the locations of the residents on a Cartesian grid, will find a suitable single splitting point.

Input

The input file contains several test cases, each of them as described below.

Input data for your program will be in the following format:

- Line 1: An integer n, $3 \leq n \leq 30000$, denoting the number of people. n is always a multiple of 3.

- Lines 2 through 4: Each line will have two floating-point numbers x_i and y_i denoting the coordinates of the ith corner of the city, separated by a single space. $-10 \leq x_i, y_i \leq 10$. The three corners are specified in counterclockwise order.

- Lines 5 through $(n + 4)$: Each line will have two floating-point numbers x_j and y_j denoting the coordinates of the jth person, separated by a single space. $-10 \leq x_j, y_j \leq 10$. All people lie in the interior of the city triangle.

The input stream ends with the end-of-file.

Output

For each test case, your program is to print a single line with two floating-point numbers x and y denoting the coordinates of the splitting point, separated by a single space and with no leading or trailing whitespace.

Each person must lie in the interior of one of the three generated triangles. Assume a person is a single point with zero radius, and that a wall is a line with zero thickness. It is guaranteed that there exists a splitting point. It is not guaranteed that such a splitting point is unique; any splitting point that partitions the people into three sets of equal size will be judged correct. You must print the answer with sufficient precision that the judges' validation program will be able to determine that the point is correct.

Sample Input

```
3
0.0 0.0
10.0 0.0
```

```
0.0 10.0
4.0 4.0
1.0 4.0
4.0 1.0
```

Sample Output

```
2.7142857137648977 2.714285714850612
```