E. Alyona and Triangles

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given n points with integer coordinates on the plane. Points are given in a way such that there is no triangle, formed by any three of these n points, which area exceeds S.

Alyona tried to construct a triangle with integer coordinates, which contains all n points and which area doesn't exceed $4S$, but, by obvious reason, had no success in that. Please help Alyona construct such triangle. Please note that vertices of resulting triangle are not necessarily chosen from n given points.

Input

In the first line of the input two integers n and S ($3 \le n \le 5000$, $1 \le S \le 10^{18}$) are given — the number of points given and the upper bound value of any triangle's area, formed by any three of given n points.

The next n lines describes given points: i^{th} of them consists of two integers x_i and y_i ($-10^8 \le x_i, y_i \le 10^8$) — coordinates of i^{th} point.

It is guaranteed that there is at least one triple of points not lying on the same line.

Output

Print the coordinates of three points — vertices of a triangle which contains all n points and which area doesn't exceed $4S$.

Coordinates of every triangle's vertex should be printed on a separate line, every coordinate pair should be separated by a single space. Coordinates should be an integers not exceeding 10^9 by absolute value.

It is guaranteed that there is at least one desired triangle. If there is more than one answer, print any of them.

Example

input
4 1 0 0 1 0 0 1 1 1

output
-1 0 2 0 0 2

Note