

Running in the Plane

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	1024 mebibytes

You are given a set $S = \{(a_1, b_1), (a_2, b_2), \dots, (a_n, b_n)\}$ of n points in the plane. All coordinates of S are integers.

A set $T = \{(c_1, d_1), (c_2, d_2), \dots, (c_m, d_m)\}$ of m 2-dimensional vectors is called a **good set** of S if it satisfies the following:

1. There exists a nonempty finite sequence $((x_0, y_0), (x_1, y_1), \dots, (x_l, y_l))$ of points in the plane such that
 - (a) $(x_0, y_0) = (0, 0)$.
 - (b) For all points p in S , there exists an integer i ($0 \leq i \leq l$) such that $(x_i, y_i) = p$.
 - (c) For all integers i ($0 \leq i < l$), the vector $(x_{i+1} - x_i, y_{i+1} - y_i)$ is in T .
2. For all integers i ($1 \leq i \leq m$), two numbers c_i and d_i are integers between -10^{18} and 10^{18} inclusive.

Find any good set of **minimum** size.

Input

The input consists of multiple test cases. The first line contains an integer Q — the number of test cases. The description of the test cases follows. For each test case:

- The first line of the test case contains an integer n — the number of points in S .
- The i -th of the next n lines contains two integers a_i and b_i — the coordinates of each point in S .

Output

For each test case:

- Let $T = \{(c_1, d_1), (c_2, d_2), \dots, (c_m, d_m)\}$ be a minimum-size good set of S .
- In the first line of the test case, print an integer m — the number of vectors in T .
- In the i -th of the next m lines, print two integers c_i and d_i — the coordinates of each vector.

If there are multiple solutions, print any of them.

It can be proved that, under the constraints of this problem, a good set of S with size at most $10 \times n$ always exists.

Scoring

- $1 \leq Q \leq 50\,000$
- The sum of n over all test cases does not exceed 10^5 .
- $2 \leq n \leq 10^5$
- $-10^8 \leq a_i, b_i \leq 10^8$ ($1 \leq i \leq n$)
- $(a_i, b_i) \neq (a_j, b_j)$ ($1 \leq i < j \leq n$)

- $m \geq 0$
- $-10^{18} \leq c_i, d_i \leq 10^{18}$ ($1 \leq i \leq m$)
- $(c_i, d_i) \neq (c_j, d_j)$ ($1 \leq i < j \leq m$)

Example

standard input	standard output
2	1
2	-10 10
-30 30	2
-50 50	1 0
3	1 1
2 1	
1 0	
4 1	

Note

In the first test case, $T = \{(-10, 10)\}$ is a minimum-size good set of $S = \{(-30, 30), (-50, 50)\}$.

We can take a sequence $((0, 0), (-10, 10), (-20, 20), \underline{(-30, 30)}, (-40, 40), \underline{(-50, 50)})$. Here, the underlined points are in S .

In the second test case, $T = \{(1, 0), (1, 1)\}$ is a minimum-size good set of $S = \{(2, 1), (1, 0), (4, 1)\}$.

We can take a sequence $((0, 0), \underline{(1, 0)}, \underline{(2, 1)}, (3, 1), \underline{(4, 1)})$.