

## Problem D. Chaos Begin

Input file:            **standard input**  
 Output file:        **standard output**  
 Time limit:         15 seconds  
 Memory limit:      512 megabytes

Long long ago, there were  $n$  points  $a_1, a_2, \dots, a_n$  on the 2D plane. The world keeps stable for a long time. However, it begins to be chaotic recently when another  $n$  points  $b_1, b_2, \dots, b_n$  appeared, where  $b_i = a_i + (\Delta x, \Delta y)$ . And now, these  $2n$  points have already lost their identifiers.

You are given these  $2n$  points in an arbitrary order, you need to figure out all the possible  $(\Delta x, \Delta y)$  to help the world recover from chaos.

### Input

The first line contains a single integer  $T$  ( $1 \leq T \leq 100$ ), the number of test cases. For each test case:

The first line of the input contains a single integer  $n$  ( $1 \leq n \leq 50\,000$ ), denoting the number of initial points.

In the next  $2n$  lines, the  $i$ -th line contains two integers  $x_i$  and  $y_i$  ( $|x_i|, |y_i| \leq 10^8$ ), describing the coordinate of a current point.

It is guaranteed that the x-coordinate and y-coordinate of each initial point are chosen uniformly at random from integers in  $[-v, v]$ , where  $v$  is chosen in  $[10^7, 10^8]$ . The randomness condition does not apply to the sample test case, but your solution must pass the sample as well.

It is also guaranteed that the sum of all  $n$  is at most 300 000.

### Output

For each test case, first output a single line containing an integer  $k$ , denoting the number of possible  $(\Delta x, \Delta y)$ . Then output  $k$  lines, each line contains two integers  $\Delta x$  and  $\Delta y$ . It is guaranteed that  $k \geq 1$ , and when  $k \geq 2$ , you should print the answers in ascending order of  $\Delta x$ , and then in ascending order of  $\Delta y$  in case of a tie.

### Example

| standard input | standard output |
|----------------|-----------------|
| 1              | 2               |
| 3              | -5 -5           |
| 1 2            | 5 5             |
| 3 4            |                 |
| 8 9            |                 |
| 7 8            |                 |
| 6 7            |                 |
| 2 3            |                 |