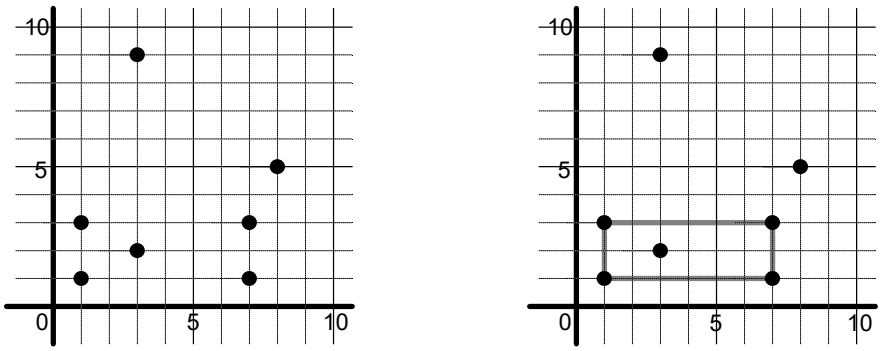
Problem 2 – Zukei Puzzle

In a Zukei puzzle, the player is given a set of seemingly random coordinates in the Cartesian plane. The player must find a geometric shape whose vertices are in the set. In this problem, the player must find only rectangles:



(a) Random coordinates? (b) Nope, a rectangle!

Figure 1: A Zukei puzzle with seven vertices.

Identify which vertices form rectangles in several Zukei puzzles given as input. Assume that only one rectangle is hidden within each puzzle and that rectangle sides are aligned with the X and Y axes – they are not rotated.

Input

The first line contains the number of puzzles. Each of the following lines contain the information about a puzzle. A puzzle line starts with the number of 2-D vertices followed by pairs of integers for the vertex coordinates, listed in XY order. For example, the first puzzle in the example input below has 7 vertices. The first vertex is (1, 1), and the final vertex is (8, 5).

```
2
7 1 1 7 1 7 3 1 3 3 9 3 2 8 5
8 4 7 8 4 7 4 4 1 5 9 2 8 5 4 8 9
```

Output

For each puzzle, print to standard output a case label and the vertices that form the rectangle in the puzzle. Lower vertices (i.e., smaller Y) appear before higher ones. In the case of a tie, the vertex farther to the left (i.e., smaller X) is printed first. For the example input given above, the output is:

```
Case 1: 1 1 7 1 1 3 7 3
Case 2: 5 4 8 4 5 9 8 9
```