Azrieli Towers

Elinor is in love with math and architecture. The only thing that can excite her even more is a combination of both. Therefore, it is not surprising that for a long time Elinor's favorite building was the ancient Pyramid of Cheops in Egypt due to its clear mathematical structure. However, a couple of days ago Elinor visited Tel Aviv, where she found a modern-style architectural counterpart to the ancient pyramid in Egypt - the Azrieli towers. This complex of buildings consists of three towers whose bases are in shape of a square, circle, and perfect triangle respectively.

Elinor was so amazed by this brilliant geometric design that she decided to construct her very own version of this landmark. In order not to be accused of plagiarism, she wants to build only two towers - one with a rectangular basis and the other one with an arbitrary triangular basis. Neither the orientation of the two towers, nor the base area matter to Elinor. However, she does not want the bases of her two towers to overlap or touch each other as this would completely destroy the beauty of the geometric design.

Unfortunately, the location at which Elinor wants to erect her two towers is known to be quite swampy so that the positioning of the towers is somewhat restricted. Luckily, Elinor is married to Nathan, a distinguished geologist, who already inspected the area thoroughly and came up with a list of specific coordinate sets at which the cornerstones of both buildings can be placed without facing problems with the statics. Given such a set of coordinates, Elinor has to decide now if her two towers can be built such that each edge of both buildings coincides with one of Nathan's cornerstone coordinates. Since this task is very time-consuming and repetitive, she wants you to write a computer program that does the job for her.

Input

The first line of the input contains an integer t. t cornerstone sets follow, each of them separated by a blank line.

Each cornerstone set starts with one integer n, where n is the number of cornerstone coordinates in the particular set. n lines follow describing the coordinates of the cornerstones. Each line contains two integers x_i and y_i where x_i is the x-coordinate and y_i is the y-coordinate of the i-th cornerstone position. One can safely assume that any three of the n cornerstone coordinates are non-collinear.

Output

For each test case, output one line containing "Case #i: s" with i being the number of the test case starting at 1, and s being "possible" if Elinor can construct her two towers with respect to the given cornerstone positions, and "impossible" otherwise. In case of "possible", output seven more lines each containing two integers x_i and y_i. The first four lines contain the x- and y-coordinates of the cornerstones of the rectangular tower. The latter three lines contain the x- and y-coordinates of the cornerstones of the triangular tower. Both coordinate sets can be given either in clockwise or counterclockwise order. If there are multiple possibilities to place the two towers, any of them will be accepted.

Constraints

- $1 \le t \le 50$
- $7 \le n \le 10$
- $0 \le x_i, y_i \le 1000$ for $1 \le i \le n$
- Any three of the n cornerstone coordinates are non-collinear

Sample Explanation

The first cornerstone set consists of 10 cornerstones. There are multiple possibilities to construct the two towers. One of them is illustrated in figure 1.

In the second test case there are only 7 cornerstone coordinates given (see figure 2). Even though it is possible to place a rectangle and a triangle with respect to the cornerstones, Elinor cannot erect her two towers because they would overlap.

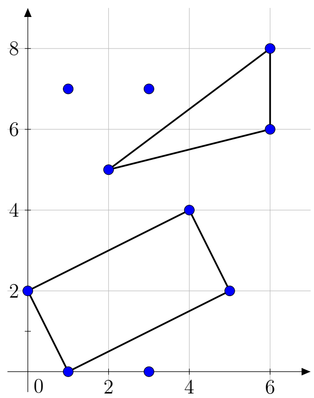

Figure 1: First sample test case.

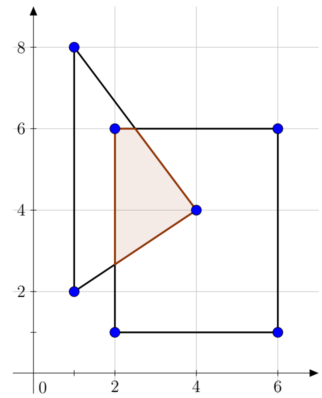

Figure 2: Second sample test case.

Sample Input 1

```
2
10
0 2
1 0
1 7
2 5
3 0
3 7
4 4
5 2
6 6
6 8

7
1 2
1 8
2 1
2 6
4 4
6 1
6 6
```

Sample Output 1

```
Case #1: possible
0 2
1 0
5 2
4 4
2 5
6 6
6 8
Case #2: impossible
```