Fragile Letters

The company Lea is working at recently bought a new building to provide offices for all employees. The new building is a skyscraper situated in the city center and widely visible from all over the town. Since the company invests heavily in advertisements, the management decided to write its name on the outer wall of the new building, too. They bought big letters that glow in the dark. The letters got delivered today, but will only be mounted next week.

When the shipping company was about to unload the letters, Lea went outside to have a break in the company-owned park and stopped by to see the huge letters. The workers were debating loudly, so Lea joined them and asked what they are arguing about. It turned out they were not sure how to position the letters. They should stand vertically, due to technical reasons, but it is possible to rotate them or even turn them upside down. Obviously, the letters should be in a stable position and should not break, but they do not even know how many such positions there are. Can you help them together with Lea?

Input

Lea measured all of the letters. Each of the letters represents one test case. Since they have a very modern font, the letters are polygons (as seen when standing next to them), which means they do not contain holes and consist of straight lines only. Lea measured the position of all of the letter's vertices and computed their two-dimensional coordinates.

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

Each test case starts with an integer n, the number of vertices. n lines follow describing the vertices. The i-th line contains two doubles x_i and y_i, the coordinates of the i-th vertex, The points are given in order, but Lea forgot whether she wrote them down clockwise or counter-clockwise. Note that due to the modern font the letters may not look like what you would expect a letter to look like. Consider them as a general simple polygon.

Output

For each test case, output one line containing "Case #i: x" where i is its number, starting at 1, and x is the number of stable positions of the letter. Each line of the output should end with a line break.

A position is considered stable if it touches the ground with exactly one edge and no vertex except the ones incident to that edge. Standing on an additional vertex or multiple edges would break the letter since it is not made for standing on the ground. Additionally, the center of mass of the letter's vertices (all mass of the letter is contained in the mountings at the vertices) needs to be above the lowermost edge or otherwise the letter would break. For instance, the letter "V" in normal fonts (Arial, for instance) has three stable positions, but a "T" has only two.

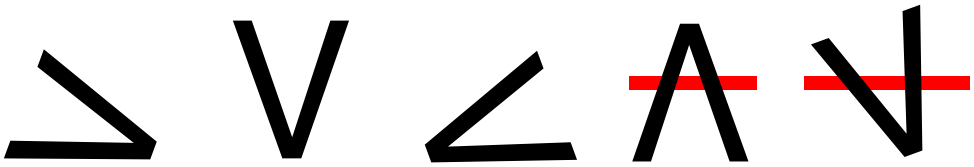

Figure 1: The letter "V" has three stable positions.

Figure 2: The letter "T" has two stable positions.

Constraints

- $1 \leq t \leq 20$
- $3 \leq n \leq 50$
- $0 \leq x_i, y_i \leq 1000$ for all $1 \leq i \leq n$

Sample Input 1

```
3
7
0.0 2.0
1.0 2.0
2.0 1.0
3.0 2.0
14.0 2.0
13.0 0.0
1.0 0.0

5
0.0 0.0
1.0 0.0
2.0 1.0
3.0 0.0
3.0 5.0

8
1.0 0.0
1.0 2.0
0.0 2.0
0.0 3.0
3.0 3.0
3.0 2.0
2.0 2.0
2.0 0.0
```

Sample Output 1

```
Case #1: 1
Case #2: 2
Case #3: 2
```

Sample Input 2

```
3
3
69.65178077847345 476.5867758189318
821.1853328040016 88.77793357104213
647.0223390027927 271.8248148626079

4
181.44458803946185 940.3664887563629
9.073553867733452 668.9316108351632
300.5477457248187 232.847850879327
736.0950978507178 376.24666402600525

6
589.537247768286 277.42135454463437
894.9913870012382 124.39634658639598
45.423403877217 250.24312860783692
509.6408941478913 630.1328761488896
166.30830193549738 595.7205262511858
826.6580132415487 795.3440293977031
```

Sample Output 2

```
Case #1: 2
Case #2: 4
Case #3: 2
```