11020 Efficient Solutions

The princess of Centauri Prime is the galaxy's most eligible bachelorette of the year. She has hopeful grooms lined up in front of the royal palace for a chance to spend 5 minutes to try and impress her. After 5 minutes, the gentleman is carried out of the royal chambers by the palace guards, and the princess makes a decision. She rates the lad on his lineage and charm by giving him a score for each of the two properties. On Centauri Prime, low scores are better than high scores.

Suppose that she observes two gentlemen - A and B. She assigns A the scores L_A and C_A (for lineage and charm, respectively). B receives scores L_B and C_B. Then A is *dominated* by B if either

- $L_B < L_A$ and $C_B \leq C_A$, or

- $L_B \leq L_A$ and $C_B < C_A$.

In other words, if at least one of B's scores is better than A's, and the other score is not worse. She considers a gentleman to be *efficient* (or Pareto-optimal) if she has not yet met any other gentleman who dominates him. She maintains a list of efficient grooms and updates it after each 5-minute presentation.

Given the queue of bachelors and the scores assigned to them by the princess, determine the number of entries in the **list of efficient grooms** after each performance.

Input

The first line of input gives the number of cases, N ($0 < N < 40$). N test cases follow.

Each one starts with a line containing n ($0 \leq n \leq 15000$) — the size of the queue. The next n lines will each contain two scores (integers in the range $[0, 10^9]$). Initially, the list is empty.

Output

For each test case, output one line containing 'Case #x:' followed by n lines, line i containing the size of the **list of efficient grooms** after the i-th update. Print an empty line between test cases.

Sample Input

```
4
1
100 200
2
100 200
101 202
2
100 200
200 100
```

```
5
11 20
20 10
20 10
100 20
1 1
```

Sample Output

```
Case #1:
1

Case #2:
1
1

Case #3:
1
2

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