Code Jam 2012 - World Finals

Shifting Paths

Problem

You have been walking in the woods for hours, and you want to go home.

The woods contain **N** clearings labeled 1, 2, ..., **N**. You are now at clearing 1, and you must reach clearing **N** in order to leave the woods. Each clearing from 1 to **N**-1 has a left path and a right path leading out to other clearings, as well as some number of one-way paths leading in. Unfortunately, the woods are haunted, and any time you enter a clearing, one of the two outgoing paths will be blocked by shifty trees. More precisely, on your k^{th} visit to any single clearing:

- You must leave along the left path if k is odd.
- You must leave along the right path if k is even.
- All paths are one-way, so you have no choice at each step: you must go forward through the one unblocked outgoing path.

So the first time you are in clearing #1, you will leave along the left path. If you ever come back to clearing #1 for a second time, you would leave along the right path; the third time, you'd leave along the left path again; and so on.

You begin at clearing #1, and when you get to clearing #**N**, you can leave the woods. How many paths do you need to follow before you get out?

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow, each beginning with a line containing a single integer **N**.

N-1 lines follow, each containing two integers $\mathbf{L_i}$ and $\mathbf{R_i}$. Here, $\mathbf{L_i}$ represents the clearing you would end up at if you follow the left path out of clearing i, and $\mathbf{R_i}$ represents the clearing you would end up at if you follow the right path out of clearing i.

No paths are specified for clearing **N** because once you get there, you are finished.

Output

For each test case, output one line containing "Case #x: y", where x is the case number (starting from 1) and y is the number of paths you need to follow to get to clearing **N**. If you will never get to clearing **N**, output "Infinity" instead.

Limits

Memory limit: 1GB.
Time limit: 30 seconds per test set.
$1 \leq \mathbf{T} \leq 30$.
$1 \leq \mathbf{L_i}, \mathbf{R_i} \leq \mathbf{N}$ for all i.

Test set 1 (Visible Verdict)

2 ≤ **N** ≤ 10.

Test set 2 (Hidden Verdict)

2 ≤ **N** ≤ 40.

Sample

Sample Input

```
2
4
2 1
3 1
2 4
3
2 2
1 2
```

Sample Output

```
Case #1: 8
Case #2: Infinity
```

Sample Explanation

In the first sample case, your route through the woods will be as shown below:

Paths followed	Clearing	Path direction
0	1	Left
1	2	Left
2	3	Left
3	2	Right
4	1	Right
5	1	Left
6	2	Left
7	3	Right
8	4	-