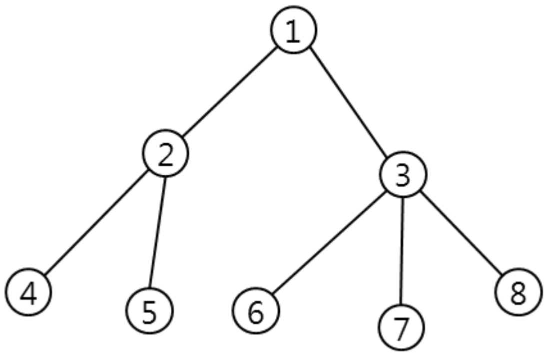
Problem 1

Ants are a lot smarter than we have been thinking they are. Recently, there have been experiments that give us a glimpse of how they communicate among themselves. The setup is something like the following. They have set up a road system like the figure below and tried to see how the ants collected food. (The road system looks like a tree and the crossing marked with 1 is the home. For convenience, we call the endpoints crossings also.) First, a scout ant walks around the roads looking for food, then if it find some it goes back home and the workers come out and go straight for the food. The experimenters removed the scout and floated the roads on water (and replacing them just before the workers come out) to eliminate the possibility that the scout leads the workers to food or leaves some chemical trail. Even then, the workers were able to find the food immediately. One interesting fact was that when the roads leading to food was simpler the workers came out earlier. Do ants use some kind of compression algorithm in their communication?



Anyway, your job is to help the scout LGee. LGee found two special crossings. A crossing is special if all the endpoints below it (itself if it is an endpoint) have food in them. For example, if the crossing numbered 3 in the above figure is a special crossing, then the endpoints numbered 6, 7, and 8 have food in them.

If one of the special crossings is on the way from home to the other special crossing, only one worker team is required. Otherwise, two worker teams are required.

Write a program that, given the structure of the road system and the two special places, decides if LGee needs one or two teams to retrieve the food. For example, if a special crossing A is on the road from home to another special crossing B, then all the endpoints below B are also below A. Maybe you can use this fact to design an efficient algorithm.

[Input]

The first line of the input file contains the number T of test cases in the file. In each test case, the first line has an integer N (2 ≤ N ≤ 200,000), the number of crossings and M (1 ≤ M ≤ 200,000), the number of queries. The crossings are numbered from 1. The ants' home is also included in the crossings and is always numbered with 1. In the next N-1 lines, the road system is given by pairs of crossings. Of the pair, the first crossing is always closer to ant's home. The structure of the road system is a tree with the root at the ants' home. In the next M lines each, a query is given by two different numbers that represent crossings.

There are two kinds of inputs listed as follows.

- Small Set: 2 ≤ N ≤ 10,000, 1 ≤ M ≤ 10,000
- Large Set: 2 ≤ N ≤ 200,000, 1 ≤ M ≤ 200,000

[Output]

For each test case given, print M lines, one for each query with a 1 if one crossing is on the way from home to the other crossing, with a 0, otherwise.

[I/O Example]

Input

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

Output

```
1
0
```

```
0
1
```