

Tree Sum

Let L_x denote the level of a node x in a rooted tree. L_x is 1 if x is the root, otherwise $L_x = 1 + L_y$, where y is the parent of x in the rooted tree.

You need to calculate the sum L_x^K for all nodes x in the tree.

Input

The first line contains the number of test cases T . T test cases follow. The first line of each test case contains N and K , where N is the number of nodes in the tree. The following $N - 1$ lines contain two integers a_i and b_i , indicating an edge between nodes a_i and b_i in the tree. There is a blank line after each test case.

Output

Output N lines for each test case. The i -th line should contain the required sum if the tree is rooted at node i . Output all values modulo 1000000007. Output a blank line after each test case.

Example

Sample Input:

```
2
3 2
0 1
1 2
```

```
3 3
0 1
0 2
```

Sample Output:

```
14
9
14
```

```
17
36
36
```

Constraints

```
1 <= T <= 10
1 <= N <= 20000
1 <= K <= 20
0 <= a_i, b_i < N
```