1752. Tree 2

Time limit: 1.0 second
Memory limit: 64 MB

Consider a tree consisting of n vertices. A *distance* between two vertices is the minimal number of edges in a path connecting them. Given a vertex v_i and distance d_i find a vertex u_i such that distance between v_i and u_i equals to d_i.

Input

The first line contains the number of vertices n ($1 \le n \le 20000$) and the number of queries q ($1 \le q \le 50000$). Each of the following $n − 1$ lines describes an edge and contains the numbers of vertices connected by this edge. Vertices are numbered from 1 to n. The next q lines describe the queries. Each query is described by a line containing two numbers v_i ($1 \le v_i \le n$) and d_i ($0 \le d_i \le n$).

Output

You should output q lines. The i-th line should contain a vertex number u_i, the answer to the i-th query. If there are several possible answers, output any of them. If there are no required vertices, output 0 instead.

Sample

input	output
9 10 1 8 1 5 1 4 2 7 2 5 3 6 5 9 6 9 5 4 8 1 4 3 2 4 9 3 1 1 5 2 3 5 6 4 7 3	0 1 2 3 4 5 6 7 8 9

Problem Author: Petr Lezhankin
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