Problem K. Rooted Subtrees

Input file:	*standard input*
Output file:	*standard output*
Time limit:	7 seconds
Memory limit:	512 mebibytes

A *tree* is a connected, acyclic, undirected graph with n nodes and $n-1$ edges. There is exactly one path between any pair of nodes. A *rooted tree* is a tree with a particular node selected as the root.

Let T be a tree and T_r be that tree rooted at node r. The *subtree* of u in T_r is the set of all nodes v where the path from r to v contains u (including u itself). In this problem, we denote the set of nodes in the subtree of u in the tree rooted at r as $T_r(u)$.

You are given q queries. Each query consists of two (not necessarily different) nodes, r and p. A set of nodes S is "obtainable" if and only if it can be expressed as the intersection of a subtree in the tree rooted at r and a subtree in the tree rooted at p. Formally, a set S is "obtainable" if and only if there exist nodes u and v where $S = T_r(u) \cap T_p(v)$.

For a given pair of roots, count the number of different non-empty obtainable sets. Two sets are different if and only if there is an element that appears in one, but not the other.

Input

The first line contains two space-separated integers n and q ($1 \le n, q \le 2 \cdot 10^5$), where n is the number of nodes in the tree and q is the number of queries to be answered. The nodes are numbered from 1 to n.

Each of the next $n-1$ lines contains two space-separated integers u and v ($1 \le u, v \le n$, $u \ne v$), indicating an undirected edge between nodes u and v. It is guaranteed that this set of edges forms a valid tree.

Each of the next q lines contains two space-separated integers r and p ($1 \le r, p \le n$), which are the nodes of the roots for the given query.

Output

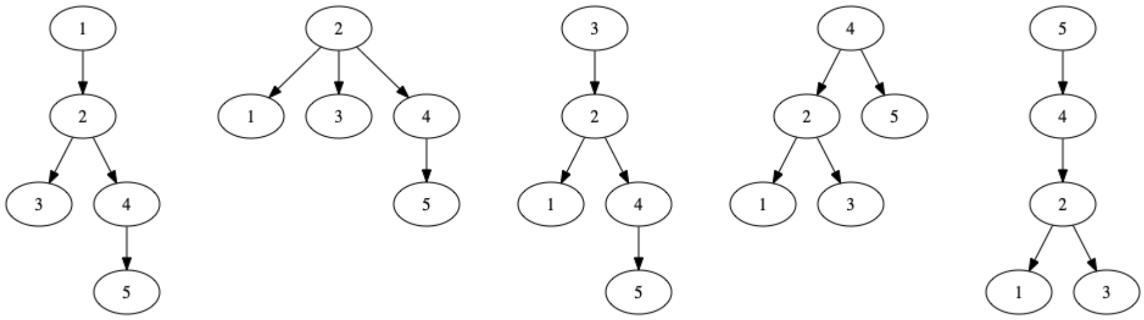
For each query output a single integer, which is the number of distinct obtainable sets of nodes that can be generated by the above procedure.

Example

standard input	standard output
5 2 1 2 2 3 2 4 4 5 1 3 4 5	8 6

Note

The possible rootings of the first tree are



Considering the rootings at 1 and 3, the 8 obtainable sets are:

1. $\{1\}$ by choosing $u = 1$, $v = 1$,
2. $\{1, 2, 4, 5\}$ by choosing $u = 1$, $v = 2$,
3. $\{1, 2, 3, 4, 5\}$ by choosing $u = 1$, $v = 3$,
4. $\{2, 3, 4, 5\}$ by choosing $u = 2$, $v = 3$,
5. $\{2, 4, 5\}$ by choosing $u = 2$, $v = 2$,
6. $\{3\}$ by choosing $u = 3$, $v = 3$,
7. $\{4, 5\}$ by choosing $u = 2$, $v = 4$,
8. and $\{5\}$ by choosing $u = 5$, $v = 5$.

If the rootings are instead at 4 and 5, there are only 6 obtainable sets:

1. $\{1\}$ by choosing $u = 1$, $v = 1$,
2. $\{1, 2, 3\}$ by choosing $u = 2$, $v = 4$,
3. $\{1, 2, 3, 4\}$ by choosing $u = 4$, $v = 4$,
4. $\{1, 2, 3, 4, 5\}$ by choosing $u = 4$, $v = 5$,
5. $\{3\}$ by choosing $u = 3$, $v = 2$,
6. and $\{5\}$ by choosing $u = 5$, $v = 5$.

For some of these, there are other ways to choose u and v to arrive at the same set.