[C4] Trickle Down Mafia (300 pts)

Time Limit: 1s
Memory Limit: 512MB

Problem Description

Inspector Mont Blanc is working undercover for the criminal organization known as the Trickle Down Mafia which has a very strict hierarchical structure. There are N mafiosos in the mafia, including the head of the mafia, and they are each assigned a code number from 1 to N. Every mafioso has exactly one boss (except the head of the mafia), and each mafioso can have zero or more subordinates. If mafioso A is mafioso B's boss, then B is one of A's subordinates.

When a mafioso is in charge of a mission, they involve their entire *capo*, a crew of henchmen. The capo of a Mafioso P is defined as the set of mafiosios including P, all of P's subordinates, their subordinate's subordinates, and so on. It is guaranteed that if a mafioso C is under mafioso A's capo, then A will not be under C's capo.

Upon completion of a mission, the leading Mafioso P would receive the mission reward of R dollars to be distributed through the entire capo. The total R is divided equally amongst all members of the capo, including P, rounding downward to a whole dollar. If there are any remaining dollars after this distribution, Mafioso P gets to keep it. Mission reward distribution does not affect the reward distribution for past or future missions.

Disguised as the mafia's accountant, it is Inspector Blanc's role to track reward money of mission completion. All missions of the month are kept in record, and the accounting is done at the end of the month. Given the mafia hierarchy and a series of missions for this month, compute the total amount of money to be paid to each member of the mafia.

Input Specification

The first line of input contains two space separated integers: N - the number of mafiosos, and M - the number of missions for the month.

$N-1$ lines follow, each containing two space separated integers, representing a boss-subordinate relationship: B_i - the assigned code number of the boss, and S_i - the assigned code number of the subordinate.

M lines follow, each containing two space separated strings, representing a mission: P_i - the code number of the mafioso in charge of the mission, and R_i - the mission reward.

Output Specification

Output N lines, each containing a single integer which is the total money to be paid to each mafioso. The first line corresponds to Mafioso 1, the second corresponds to Mafioso 2, and so on.

Constraints

$1 \leq N \leq 100000$
$1 \leq M \leq 100000$
$1 \leq B_i, S_i, P_i \leq N$
$1 \leq R_i \leq 10^9$
All mafiosos have exactly one boss, except for a single head mafioso who has no boss.

Sample Input

```
8 4
1 2
1 3
1 4
3 5
4 6
4 7
5 8
4 9
2 5
1 15
1 2
```

Sample Output

```
10
6
1
4
1
4
4
1
```

Explanation

In the first mission, Mafiosos 4, 6 and 7 each receive 3 dollars. In the second mession, Mafioso 2 has no subordinates so he receives all 5 dollars. In the third mission, 1 dollar is distributed to all Mafisios (1-8), the remainder of 7 dollars is kept by the mission head, Mafioso 1. In the final mission, no money (0 dollars) will be distributed to the Mafiosos in the capo (1-8), the remainder of 2 dollars is kept by the mission head, Mafioso 1.