| ▮▮▮ **CODEFORCES**
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F. Sheriff's Defense

time limit per test: 2 seconds

memory limit per test: 256 megabytes

"Why, master," quoth Little John, taking the bags and weighing them in his hand, "here is the chink of gold."

The folk hero Robin Hood has been troubling Sheriff of Nottingham greatly. Sheriff knows that Robin Hood is about to attack his camps and he wants to be prepared.

Sheriff of Nottingham built the camps with strategy in mind and thus there are exactly n camps numbered from 1 to n and $n - 1$ trails, each connecting two camps. Any camp can be reached from any other camp. Each camp i has initially a_i gold.

As it is now, all camps would be destroyed by Robin. Sheriff can strengthen a camp by subtracting exactly c gold from **each of its neighboring camps** and use it to build better defenses for that camp. Strengthening a camp **doesn't change** its gold, only its neighbors' gold. A camp can have negative gold.

After Robin Hood's attack, all camps that have been strengthened survive the attack, all others are destroyed.

What's the maximum gold Sheriff can keep in his surviving camps after Robin Hood's attack if he strengthens his camps optimally?

Camp a is neighboring camp b if and only if there exists a trail connecting a and b. Only strengthened camps count towards the answer, as others are destroyed.

Input

The first line contains a single integer t ($1 \le t \le 10^4$) — the number of test cases.

Each test case begins with two integers n, c ($1 \le n \le 2 \cdot 10^5, 1 \le c \le 10^9$) — the number of camps and the gold taken from each neighboring camp for strengthening.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($-10^9 \le a_i \le 10^9$) — the initial gold of each camp.

Then follow $n - 1$ lines, each with integers u, v ($1 \le u, v \le n, u \ne v$) — meaning that there is a trail between u and v.

The sum of n over all test cases doesn't exceed $2 \cdot 10^5$.

It is guaranteed that any camp is reachable from any other camp.

Output

Output a single integer, the maximum gold Sheriff of Nottingham can keep in his surviving camps after Robin Hood's attack.
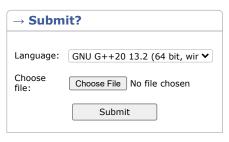
Example

```
input                                              Copy
5
3 1
```

→ Virtual participation   ⌄

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Language: [GNU G++20 13.2 (64 bit, wir ⌄]

Choose file: [Choose File] No file chosen

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→ Problem tags

(dp) (dp) (dp) (trees) (trees) (trees)

No tag edit access

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

output   Copy

```
3
8
0
17
26
```

Note

In the first test case, it is optimal to strengthen the second base. The final gold at each base is $[1, 3, 0]$.

In the second test case, it is optimal to strengthen all bases. The final gold at each base is $[2, 4, 2]$.

In the third test case, it is optimal to not strengthen any base.