Dictatorship

In a country run by a dictator king there are N cities and N−1 roads that each connects two different cities. The cities are sequentially numbered (represented like #1, #3,...) from 1 to N. It is known that you can travel from any city to any other city by a path made up of one or more roads. The office of the dictator is located in city #1.

Many people complained because the paths between some pairs of cities are too long. The king decided to add a few roads to remedy the situation. The king, being a dictator, insists that any added road should connect city #1 with another city (other than city #1) which is currently connected to only one road. The king wants to add a road even to a city that is currently directly connected to city #1 by a road when the above mentioned condition is met.

Write a program, given the number N of cities, the way the roads are connected and the lengths of roads before new roads are added, and the lengths of newly added roads, prints for each given pair of cities the length of the shortest path between the pair **before the roads are added** and **after the roads are added**. Just to make the size of the output manageable, the program should compute the answers for all given pairs and then print the sum of the first answers and the sum of the second answers.

[Input]
In the first line of the input file is given the number of test cases in the file. (T ≤ 35) The first line of a test case is given the number N of cities and the number Q of questions. (2 ≤ N ≤ 100,000, 1 ≤ Q ≤ 300,000) The cities are numbered from 1 to N. In the next N−1 lines, the information on how the roads are connected is given. In the c-th line of the N−1 lines, the first integer is the city number that is connected to city #(c+ 1). This number is always smaller than c+ 1. The second positive integer in the line is the length of the road. At this point, let M be the number of cities (other than city #1) that has only one road connected to it. The value of M will not be explicitly given in the input. In the next M lines the lengths of the newly added roads that connect each of the M cities to city #1. The lengths will be given in the increasing order of city numbers. In the next Q lines, a question is in each line. The question is given by a pair of integers, which are the city numbers.

The inputs are given in 4 sets as follows:

- Set 1: 2 ≤ N ≤ 10, 1 ≤ Q ≤ 10

- Set 2: 2 ≤ N ≤ 1,000, 1 ≤ Q ≤ 5,000

- Set 3: 2 ≤ N ≤ 100,000, 1 ≤ Q ≤ 100

- Set 4: 2 ≤ N ≤ 100,000, 1 ≤ Q ≤ 300,000

[Output]
For each question, calculate the lengths of shortest path between the given cities before the roads are added and after the roads are added. Then print the sum of the first answers and the sum of the second answers in a single line.

[I/O Example]
Input

```
2
5 2
1 1
1 5
2 2
2 2
2
1
5
1 4
5 1
3 1
1 2
1 2
1
1
2 3
```

Output

```
6 4
4 2
```