

Nitish and Magic Spells

Problem Statement

Nitish is a businessman and he is going to visit a country named Graphland to meet Ashish for a new business deal. Graphland has N cities numbered as 0 to $N - 1$ and they are connected exactly by $N - 1$ *one-way* roads which don't form cycles. Ashish has agreed to meet Nitish at any city of Graphland that Nitish would like.

Nitish has several clients in this country. He has atmost one client in each city of Graphland. To each of the client, he has to either pay or recieve some amount of money.

Nitish has some financial issues, so he can only book two air tickets- one to enter Graphland from any city he like and the other to leave from any city he likes that he can reach via roads from the city he entered Graphland.

Now as you are Nitish's best friend he came to you and shared his secret that he has K magical spells with which he can multiply the payment, M times that he is going to receive or pay (e.g., if M is 3 and he uses a spell on a client he will be receiving €15 instead of receiving €5 and he will be paying €15 instead of paying €5).

Now he wants you to find a path from any city to another from which he can gain maximum amount out of this trip using atmost K spells and tell him that amount. If there is no way of gaining any amount then choose the path where he pays the least.

Input Format

First Line contains an integer T , representing the number of test cases.

- First line of each test case contains three space separated integers N , M and K respectively.
- Second line contains N integers C_0, C_1, \dots, C_{N-1} , where C_i represents the amount of payment in the city i . A positive integer represents amount to be received, a negative integer represents amount to be paid and zero represents no client in that city.
- Next $N - 1$ lines follow which contains two integers X and Y , denoting one-way road from X to Y .

Constraints

- $1 \leq T \leq 10$
- $2 \leq N \leq 10^4$
- $1 \leq M \leq 10^3$
- $1 \leq K \leq 300$
- $-10^3 \leq C_i \leq 10^3$
- $0 \leq X, Y \leq N - 1$
- $X \neq Y$

Output Format

For each test case print either a *postive integer* denoting the maximum amount that Nitish can gain from

this trip or a *negative integer* denoting the minimum amount he has to pay if it is impossible to gain any amount.

Sample Input

```
3
3 3 3
-5 -6 -1
1 2
0 1
3 3 3
-5 0 -1
1 2
0 1
9 2 2
2 2 -1 4 -3 2 10 1 8
4 0
4 1
0 2
0 3
0 5
2 6
1 7
1 8
```

Sample Output

```
-1
0
23
```

Explanation

Testcase 1

Nitish has to pay at each city so the best he can do is to *enter Graphland from city 2*, make the deal in this city and *leaves from the same city* and it costs him €-1 .

Testcase 2

Nitish has to pay at each city so the best he can do is to *enter Graphland from city 2*, make the deal in this city and *leaves from the same city* and he can gain €0 .

Testcase 3

Nitish *enters Graphland at city 0* and follows the path $0 \rightarrow 2 \rightarrow 6$ to reach at city 6 and *leaves from city 6*. He uses two spells:

- At city 0, so he gains $2 \times 2 = \text{€4}$ at city 0.
- At city 6, so he gains $2 \times 10 = \text{€20}$ at city 6.

He has to pay €-1 at city 2, thus he gains total $\text{€4} + \text{€(-1)} + \text{€20} = \text{€23}$