Statement

In the alternate universe there are mysterious creatures known as white-walkers, they have the army of dead consisting of **N** wights numbered as 1 to N, these wights are the dead creature controlled by the conscious of white-walkers. Each wights have their own subconscious level **A[i]** which makes them difficult to be controlled by the white-walkers. Each white-walker can only control at max **L** number of wights and their sum of subconscious level must not be greater than **S**

Saurav being a wight expert have cracked the way, white-walkers control the wights. Wights have their own dead network with minimum possible connections, with oldest wight being at root denoted as **O**. White-walkers control this network by choosing one straight vertical path, without branching.

Sidhant being the Night King want to find minimum number of white-walkers required to control the army of dead.

War may go on for many days, so Night-King want to automate this process. So you being a programming expert help Night King to win over the greedy humans.

Inputs

The first line contains an integer **T** denoting the number of test cases
For each of the test case,

- First line contains **N, L, S, O**
- Second lines contains N integers, **A[i]** for 0<=i<N
- Following N-1 lines contains two integer a,b denoting a connection between ath wights and bth wights

Output

Find minimum number of white-walkers required to control the army of dead or print -1 if not possible

Constraints:

1<=T<=100
1<= N,L,A[i] <=10^5
1<= S<10^12
1<= O<=N

Example

Input

```
2
3 3 6 1
1 2 3
1 2
1 3
1 1 10000 1
10001
```

Output

```
2
-1
```