Ada and Football

Ada the Ladybug has many friends who live on a [tree](#). Each of them is fan of a football team. Ada sometime go on a trip from one friend to another. If she meets a friend she tells him/her about all previously visited friends who are fans of the same team. The visited friend will gain **+1** happiness for each friend Ada told him/her about.

Ada is wondering (for each trip) what will be the total gaines happiness.

Also note that sometime a friend changes his/her mind and start to support different team.

Input

The first line two integers $1 \leq N\ Q \leq 10^5$, the number of friends (**N**) and the number of queries.

The next line will contain **N** integers $0 \leq A_i \leq 10^5$, the team which **i**^th friend supports.

The next **N-1** lines will contain two integers $0 \leq a, b < N$, the friends which will be connected by a branch (edge).

The next **Q** lines will be of two kinds:

1 x y ($0 \leq x < N$, $0 \leq y \leq 10^5$), meaning that **x**^th friend will start supporting team **y** (instead of the old one).

2 a b ($0 \leq a, b < N$), meaning that Ada will travel from friend **a** to friend **b** and wants to know the happiness.

Output

For each query of second kind, output the gained happiness.

Example Input

```
7 8
0 0 1 2 1 1 2
0 1
1 5
1 2
2 4
2 3
3 6
2 4 5
2 0 6
2 1 3
1 1 2
1 2 2
2 4 5
2 0 6
2 1 3
```

Example Output

3
2
0
2
6
3