



## F. BUREAUCRACY

There is a node-weighted, root-fixed tree of  $N$  vertices with indices running from  $0$  to  $N-1$ , and vertex  $0$  is the root. You are given  $Q$  queries of three types:

- 1  $u$   $w$ . First the edges connecting  $u$  and its children are deleted. Then, a new vertex indexed with the first unused index (that is, the first vertex created from queries of this type will have index  $N$ , second will have  $N+1$ , etc.) is created, with  $w$  as its weight,  $u$  as its parent and  $u$ 's former children as its children.
- 2  $u$ , vertex  $u$  is deleted, and its children will become children of  $u$ 's parent. It is guaranteed that  $u$  is not the root.
- 3  $u$   $v$   $k$ , you are asked to output the  $k$ -th smallest weight on the path connecting  $u$  and  $v$ .  $k$  is guaranteed to be no greater than the number of nodes on the path connecting  $u$  and  $v$  (i.e.  $k \leq d(u, v) + 1$  with  $d(u, v)$  being the distance between  $u$  and  $v$ )

### INPUT

The first line contains 2 integers  $N$  and  $Q$ . ( $N, Q \leq 5 \times 10^4$ )

The second line contains  $N$  integers, the  $i$ -th of which denotes the weight of vertex  $i-1$ . All weights are between  $0$  and  $10^9$ , inclusive.

Each of the next  $N-1$  lines contains 2 integers  $u$  and  $v$ , denoting there is an edge between  $u$  and  $v$ .

Finally,  $Q$  lines follow, describing queries in the format above.

### OUTPUT

For each of query of type 3, output the answer on a new line.

Sample Input	Sample Output
10 10	92018216
364715055 598838324	34702917
844502191 211147053	
438769309 303905477	
513518273 332723869	
92018216 34702917	
1 5	
3 2	
2 5	
6 8	
7 5	
5 8	
8 4	
4 0	
0 9	
3 2 0 1	
1 4 951058488	
3 9 2 1	
1 9 847945860	
2 11	
1 4 873328923	
2 8	
1 4 743926561	
2 4	
1 0 390537674	