G. Can Bash Save the Day?

time limit per test: 5 seconds
memory limit per test: 768 megabytes
input: standard input
output: standard output

Whoa! You did a great job helping Team Rocket who managed to capture all the Pokemons sent by Bash. Meowth, part of Team Rocket, having already mastered the human language, now wants to become a master in programming as well. He agrees to free the Pokemons if Bash can answer his questions.

Initially, Meowth gives Bash a weighted tree containing n nodes and a sequence $a_1, a_2..., a_n$ which is a permutation of $1, 2, ..., n$. Now, Mewoth makes q queries of one of the following forms:

- `1 l r v`: meaning Bash should report , where $dist(a, b)$ is the length of the shortest path from node a to node b in the given tree.
- `2 x`: meaning Bash should swap a_x and a_{x+1} in the given sequence. This new sequence is used for later queries.

Help Bash to answer the questions!

Input

The first line contains two integers n and q ($1 \le n \le 2 \cdot 10^5$, $1 \le q \le 2 \cdot 10^5$) — the number of nodes in the tree and the number of queries, respectively.

The next line contains n space-separated integers — the sequence $a_1, a_2, ..., a_n$ which is a permutation of $1, 2, ..., n$.

Each of the next n - 1 lines contain three space-separated integers u, v, and w denoting that there exists an undirected edge between node u and node v of weight w, ($1 \le u, v \le n$, $u \ne v$, $1 \le w \le 10^6$). It is guaranteed that the given graph is a tree.

Each query consists of two lines. First line contains single integer t, indicating the type of the query. Next line contains the description of the query:

- **t = 1**: Second line contains three integers a, b and c ($1 \le a, b, c < 2^{30}$) using which l, r and v can be generated using the formula given below:
  - ,
  - ,
  - .
- **t = 2**: Second line contains single integer a ($1 \le a < 2^{30}$) using which x can be generated using the formula given below:
  - .

The ans_i is the answer for the i-th query, assume that $ans_0 = 0$. If the i-th query is of type 2 then ans_i = $ans_{i - 1}$. It is guaranteed that:

- **for each query of type 1**: $1 \le l \le r \le n$, $1 \le v \le n$,
- **for each query of type 2**: $1 \le x \le n$ - 1.

The operation means bitwise exclusive OR.

Output

For each query of type 1, output a single integer in a separate line, denoting the answer to the query.

Example

input

```
5 5
4 5 1 3 2
4 2 4
1 3 9
4 1 4
4 5 2
1
1 5 4
1
22 20 20
2
38
2
39
1
36 38 38
```

output

```
23
37
28
```

Note

In the sample, the actual queries are the following:

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