Problem K. Shuttle Tour

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

Prof.Chen won the champion of the ICPC regional and qualified for the ICPC World Finals next year. To get a good rank in the coming World Finals, he and his teammates are taking part in ICPC Pre-Finals Training Camp in Byteburg now.

Byteburg is a beautiful city with n amazing attraction locations, labeled by $1, 2, \ldots, n$. There are $n-1$ two-way roads between locations such that every pair of locations are connected directly or indirectly. There are at most 50 locations linked to exactly one road in Byteburg.

Unfortunately, some (maybe zero) attractions are not open to tourists. Every afternoon, after 5-hour training, Prof.Chen will browse the tourism website to see which attractions are open, and will then make a shuttle tour plan. You need to perform q operations. Each operation is one of the following:

- "`1` x" ($1 \le x \le n$): Change the status of the attraction at the x-th location. If it is open, it will then be closed, and vice versa.
- "`2` l r" ($1 \le l \le r \le n$): Prof.Chen is now planning to visit every open attraction indexed in $[l, r]$ by shuttle. The shuttle will start at a location, move along roads and finally return to the start location, such that every open attraction is visited at least once. Note that even though the attraction at a location is closed, the shuttle can still reach that location. The start location and the route of the shuttle tour can be assigned by Prof.Chen, he wants to minimize the total length of the route. Please write a program to find the shortest route.

Input

The first line of the input contains two integers n and q ($1 \le n, q \le 200\,000$), denoting the number of locations and the number of operations.

The second line contains a string S of length n, S_i ($S_i \in \{$'`0`', '`1`'$\}$) denoting the initial status of the attraction at the i-th location. Here, '`0`' denotes closed, and '`1`' denotes open.

Each of the next $n-1$ lines contains three integers u_i, v_i and w_i ($1 \le u_i, v_i \le n$, $u_i \ne v_i$, $1 \le w_i \le 10^9$), denoting a two-way road between the u_i-th location and the v_i-th location, whose length is w_i. It is guaranteed that every pair of locations are connected directly or indirectly.

Each of the next q lines describes an operation in formats described in the statement above.

It is guaranteed that there are at most 50 locations linked to exactly one road.

Output

For each query, print a single line containing an integer, denoting the minimum length of the route. Note that when all the attractions indexed in $[l, r]$ are closed, please print "`-1`" instead.

Example

standard input	standard output
5 6 10110 1 2 1 1 3 10 2 4 100 3 5 1000 2 1 5 1 3 2 1 5 2 2 4 2 5 5 2 1 1	222 202 0 -1 0