Problem D: LCA minimum request

Advanced Algorithms for Programming Contests

Restrictions

Time: 5 seconds
Memory: 512 MB

Problem description

Given a rooted tree with N vertices, numerated from 0 to $N-1$ with 0 being the root. You are to respond to M requests of LCA for a pair of vertices.

The requests are generated as follows. Given a_1, a_2 and numbers x, y and z, the numbers $a_3, ..., a_{2M}$ generated as $a_i = (xa_{i-2} + ya_{i-1} + z) \mod N$. The first request is $lca(a_1, a_2)$. If the response of the $(i-1)$-th request is v, then the i-th request is $lca((a_{2i-1} + v) \mod N, a_{2i})$.

Input

The input consists of

- one line containing N and M ($1 \leq N \leq 10^5, 1 \leq M \leq 10^7$) – the numbers of vertices and requests
- one line containing $N-1$ integers, the i-th of which being the ancestor of vertex i
- one line containing the parameters a_1 and a_2 ($0 \leq a_1, a_2 \leq N-1$)
- one line containing the parameters x, y and z ($0 \leq x, y, z \leq 10^9$).

Output

Output the sum over the correct responses to all requests.

Sample input and output

Input	Output
3 2 0 1 2 1 1 1 0	2