Problem F. Flight

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

You are given a tree with N vertices. The distance between two vertices is the number of edges lying on the simple path between them.

There are Q queries. Each query is specified by two vertices u and v and an integer d. A pair of vertices is called *good* if the distance between them is not less than d. In each step, you can only move between a good pair of vertices. Now your task is to calculate the minimum number of steps you have to make in order to get from u to v. If you can not reach the destination, the answer is -1.

A lot of queries are given to you to make this problem difficult.

Input

The first line of input contains three integers N, Q and M: the number of vertices, the number of queries and the upper bound for d. ($1 \le N \le 2 \cdot 10^5$, $1 \le Q \le 10^6$, $1 \le M \le 2 \cdot 10^5$).

The second line contains $N-1$ integers f_2, f_3, ..., f_N which mean that, for every i such that $2 \le i \le N$, there is an edge between vertices i and f_i in the tree ($1 \le f_i < i$).

The third line contains six integers u_1, v_1, d_1, A, B and C ($1 \le u_1, v_1 \le N$, $0 \le d_1 < M$, $10^4 \le A, B, C \le 2 \cdot 10^4$).

The first query is specified by u_1, v_1 and d_1.

The i-th ($2 \le i \le Q$) query is specified by u_i, v_i and d_i which are generated by the following rules:

- $u_i = ((A \cdot u_{i-1} + B + ans_{i-1}) \bmod N) + 1$,
- $v_i = ((B \cdot v_{i-1} + C + ans_{i-1}) \bmod N) + 1$,
- $d_i = (C \cdot d_{i-1} + A + ans_{i-1}) \bmod M$.

Here, ans_k is the answer for query k.

Output

Output the integer

$$S = \sum_{i=1}^{Q} i \cdot (ans_i + 1).$$

Example

standard input	standard output
6 9 5 1 2 1 3 3 6 3 0 10865 16947 15183	55