Segment Tree

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 1024 megabytes

Recently, Little Y learned how to maintain a sequence using a segment tree and support the operation of interval summation.

The following provides the definition of the segment tree in this problem, which might differ from the segment tree you are familiar with.

- A segment tree is a rooted binary tree, with each node corresponding to an interval $[l, r)$ on the sequence, where the root node corresponds to $[0, n)$.
- For each node, if the interval $[l, r)$ it represents satisfies $r - l = 1$, then it is a leaf node; otherwise, there exists an integer m $(l < m < r)$, such that its left child represents the interval $[l, m)$ and its right child represents the interval $[m, r)$.
  - It can be noted that the shape of the segment tree depends on the choice of the division point m for each non-leaf node.
- In the problem of interval summation, for the sequence $a_0, a_1, \ldots, a_{n-1}$, each node $[l, r)$ of the segment tree maintains the value of $(a_l + a_{l+1} + \cdots + a_{r-1})$.

Little J has an array of length N, $A_0, A_1, \ldots, A_{N-1}$, and he does not know any number in A, but he has a segment tree that maintains the interval sum of A. The segment tree is given by $X_1, X_2, \ldots, X_{N-1}$, where X_i is the division point of the i-th non-leaf node in the preorder traversal of the segment tree. For example, if $N = 5, X = [2, 1, 4, 3]$, then the nodes contained in the segment tree's preorder traversal are $[0, 5), [0, 2), [0, 1), [1, 2), [2, 5), [2, 4), [2, 3), [3, 4), [4, 5)$.

Little J has M intervals $[L_1, R_1), [L_2, R_2), \ldots, [L_M, R_M)$, and he wants to know, among all the subsets of the 2^{2N-1} segment tree nodes, how many subsets S satisfy the following condition:

- If the values maintained by all nodes in S are known, then the sum of each interval $[L_i, R_i)$ can be uniquely determined.

For example, if $[0, 1), [1, 2)$ are known, then the sum of $[0, 2)$ can be determined; conversely, if $[0, 1), [0, 2)$ are known, then the sum of $[1, 2)$ can also be determined. However, if only $[0, 2), [2, 4)$ are known, then the sum of $[0, 3)$ or $[1, 2)$ cannot be determined.

Since the answer can be very large, you need to output the answer modulo $998,244,353$.

Input

The first line of the input contains two integers N and M ($2 \le N \le 2 \times 10^5$, $1 \le M \le \min\left\{\frac{N(N+1)}{2}, 2 \times 10^5\right\}$).

The second line of the input contains $N - 1$ integers $X_1, X_2, \cdots, X_{N-1}$ ($1 \le X_i \le N - 1$, the sequence X_i describes a valid segment tree).

The following M lines describes the values of L_i and R_i ($0 \le L_i < R_i \le N$). The i-th line of these lines contains two integers L_i and R_i.

It is guaranteed that $(L_i, R_i) \neq (L_j, R_j)$ for all $i \neq j$.

Output

Output a single line with a single integer, indicating the answer modulo $998\,244\,353$.

Examples

standard input	standard output
2 1 1 0 2	5
2 1 1 1 2	5
5 2 2 1 4 3 1 3 2 5	193
10 10 5 2 1 3 4 7 6 8 9 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10	70848