Basic Counting Practice Problems

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

Consider a tree with n nodes, where node 1 is the root. Each node i in the tree has a weight p_i, such that $p_1, p_2, \ldots, p_n$ is a permutation.

Let $L_{u,v}$ denote the maximum weight of any node on the simple path from node u to node v (including u and v). Let $subtree(i)$ represent the set of nodes that make up the subtree of node i. We define $S_i = \{u | u \in subtree(i) \wedge L_{u,i} \leq p_i\}$, which is the set of nodes that can be reached starting from i, only moving to children and only passing through nodes with weights less than or equal to p_i. Let $f_i = |S_i|$, which represents the size of the set of nodes.

We define the value of a node as q_{f_i}, where q is a given value sequence $q_1, q_2, \ldots, q_n$.

Now we want to compute, for each pair (i, j), the sum of the values of node i for all weight configurations that satisfy $p_i = j$. Since the answer may be very large, please output the result modulo $10^9 + 7$.

Input

The first line contains one integer n $(1 \leq n \leq 700)$, representing the number of nodes in the tree.

The next line contains n integers, representing $q_1, q_2, \ldots, q_n$ $(0 \leq q_i < 10^9 + 7)$.

The following $n - 1$ lines each contain two integers u, v, representing an edge in the tree.

Output

Output n lines, each containing n integers. The i-th line and the j-th integer represent the corresponding answer modulo $10^9 + 7$.

Examples

standard input	standard output
3 1 1 2 1 2 2 3	2 2 4 2 2 2 2 2 2
4 1 2 3 4 1 2 2 3 1 4	6 10 16 24 6 8 10 12 6 6 6 6 6 6 6 6
7 3 7 2 4 1 8 9 1 2 1 3 2 4 4 5 3 6 4 7	2160 3120 3168 2952 2160 3720 6480 2160 2640 2640 2412 2208 2280 2880 2160 2640 3120 3600 4080 4560 5040 2160 3120 3648 3744 3408 2640 1440 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160 2160