Problem I. Infinite Binary Embedding

Input file:	`infinite.in`
Output file:	`infinite.out`
Time limit:	2 seconds
Memory limit:	256 mebibytes

Vasya has got himself an *infinite binary tree* T, which can be formally described as follows: T has infinitely many vertices, which are numbered starting from 1. Each vertex of T has two *children* — *left son* and *right son*. The left son of the vertex i is the vertex $2i$, and the right son of the vertex i is the vertex $2i + 1$.

Also, Vasya has another binary tree G (quite fortunately, a finite one). Every vertex of G is either an *internal vertex* or a *leaf*. An internal vertex has a left son and a right son (and is called the *parent* of its children), and a leaf vertex has no children. Each vertex has exactly one parent, except for one vertex which has no parent; this vertex is called the *root* of the tree G.

Vasya would like to *embed* the tree G in the infinite tree T. Formally, an *embedding* is defined as a function $f : V(G) \to V(T)$ (here $V(X)$ is the set of vertices of the tree X) with the following property: if the vertex v is a left (alternatively: right) son of the vertex u in G, then the vertex $f(v)$ must lie in the subtree of the left (alternatively: right) son of the vertex $f(u)$ in T.

Informally, an embedding is a way to put the vertices of G somewhere on T so that if we draw paths between all the embedded vertices and their children, the drawing looks like G with some of the edges possibly extended downwards (looking at the pictures for the sample cases might help to understand the notion better).

Additionally, for each leaf vertex v Vasya has chosen a number h_v — the *height* of the vertex of T that v should be embedded to (the *height* of a vertex is the number of edges between the vertex and the root of the tree). That is, $\text{height}(f(v)) = h_v$ must hold for every leaf v of the tree G.

Now, Vasya wants to know the number of different embeddings of G in T such that each leaf v is embedded to a vertex with height h_v. As the number may be quite large, find it modulo $10^9 + 7$.

Input

The first line contains one integer n — the number of vertices of G ($1 \le n \le 2000$).

The next n lines describe the tree G and the numbers h_v.

If the i-th vertex is an internal vertex, then the first number in the i-th line will be 0, followed by the numbers of its left and right sons respectively.

If the i-th vertex is a leaf, then the first number in the i-th line will be 1, followed by the number h_i for this leaf. All h_i satisfy $0 \le h_i \le 10^9$.

It is guaranteed that the root of G is the vertex 1.

Output

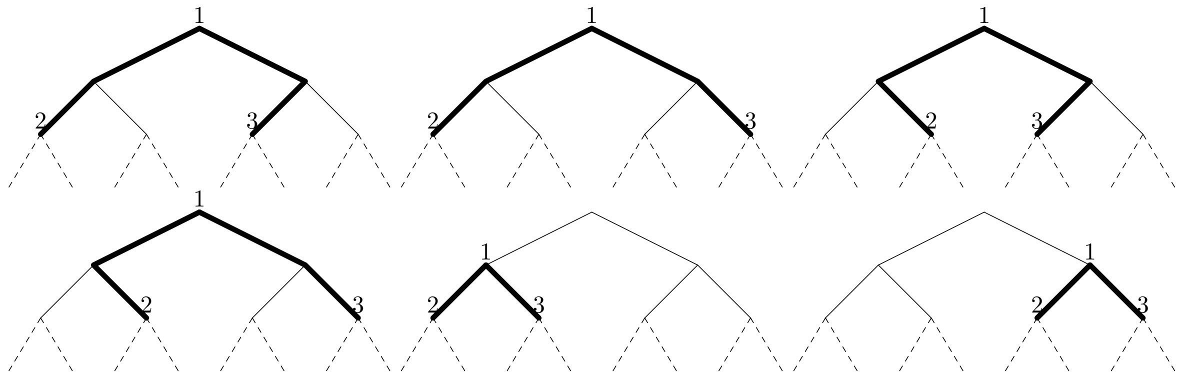
Print one integer — the number of appropriate embeddings modulo $10^9 + 7$.

Examples

infinite.in	infinite.out
3 0 2 3 1 2 1 2	6
5 0 2 3 0 4 5 1 2 1 3 1 3	14
3 0 2 3 1 0 1 0	0
1 1 0	1

Note

All six possible embeddings for the first sample (note that the root of G does not have to coincide with the root of T):



All fourteen possible embeddings for the second sample: