

Tree Moving

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

A tree T consisting of N vertices and $N - 1$ edges is given, with vertices numbered from 1 to N and edges numbered from 1 to $(N - 1)$.

You need to move all the vertices of T to points on a D -dimensional integer grid \mathbb{Z}^D . The points the vertices are moved to must satisfy the following condition.

- Let the new position of vertex i be $(x_{i,1}, x_{i,2}, \dots, x_{i,D})$ after moving. $x_{i,j}$ is an integer.
- Let the distance $\text{dist}(i, j)$ between vertex i and vertex j be the number of edges on the path from vertex i to vertex j .
- For all $1 \leq i < j \leq N$, $|x_{i,1} - x_{j,1}| + |x_{i,2} - x_{j,2}| + \dots + |x_{i,D} - x_{j,D}| = \text{dist}(i, j)$ must be satisfied.

Find the minimum dimension D required to move the tree's vertices satisfying the condition, then move the vertices appropriately.

Input

The first line of input contains N , denoting the number of vertices of the tree. ($2 \leq N \leq 2000$)

The i -th of the following $N - 1$ lines contains two space-separated integers denoting the two vertices of the tree connected by edge i .

Output

In the first line, print the minimum dimension D to which the tree's vertices can be moved.

Then print N lines starting from the second line. The i -th line of these lines must contain D integers $x_{i,j}$. ($1 \leq j \leq D$)

$x_{i,j}$ denotes the j -th coordinate value of the point that vertex i is moved to, and $-10^9 \leq x_{i,j} \leq 10^9$ must hold.

If there are multiple ways to move the tree's vertices onto the integer grid, print any.

Example

standard input	standard output
5	2
1 2	0 0
1 3	-1 0
1 4	1 0
1 5	0 -1
	0 1