Problem I. Color-Balanced Tree

Input file: `standard input`
Output file: `standard output`

There are various types of balanced trees, such as height-balanced trees and weight-balanced trees. There are also trees where each vertex is assigned a color, such as red-black trees. How about a color-balanced tree?

A tree containing an even number of vertices is called a color-balanced tree if it satisfies the following properties:

- Each vertex is assigned a color, cyan or white.
- There are an equal number of cyan and white vertices.
- For every simple path in the tree, the absolute difference between the numbers of cyan and white vertices must not exceed 3.

To illustrate these properties, you need to color each vertex either cyan or white to make a given tree a color-balanced tree, if possible. Of course, the total number of vertices of the tree would be even, denoted by $2n$.

Input

The input consists of multiple test cases. The first line contains an integer T ($1 \leq T \leq 10^4$), the number of test cases. For each test case:

- The first line contains an integer n ($1 \leq n \leq 10^5$), denoting that there are $2n$ vertices.
- Then $2n-1$ lines follow, each of which contains two integers u and v ($1 \leq u, v \leq 2n$), indicating an edge connecting the u-th and the v-th vertices.

It is guaranteed that the given edges form a tree, and the sum of n over all test cases does not exceed 10^5.

Output

For each test case,

- If there is a solution, output a line containing $2n$ integers $c_1, c_2, \ldots c_{2n}$ ($c_i \in \{0, 1\}$), separated by single spaces. If $c_i = 0$, the i-th vertex is colored cyan, or otherwise the i-th vertex is colored white.
- Otherwise, print -1 in a line.

Example

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