

F. Tree Destruction

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

You are given an unweighted tree with n vertices. Then $n - 1$ following operations are applied to the tree. A single operation consists of the following steps:

1. choose two leaves;
2. add the length of the simple path between them to the answer;
3. remove one of the chosen leaves from the tree.

Initial answer (before applying operations) is 0. Obviously after $n - 1$ such operations the tree will consist of a single vertex.

Calculate the maximal possible answer you can achieve, and construct a sequence of operations that allows you to achieve this answer!

Input

The first line contains one integer number n ($2 \leq n \leq 2 \cdot 10^5$) — the number of vertices in the tree.

Next $n - 1$ lines describe the edges of the tree in form a_i, b_i ($1 \leq a_i, b_i \leq n, a_i \neq b_i$). It is guaranteed that given graph is a tree.

Output

In the first line print one integer number — maximal possible answer.

In the next $n - 1$ lines print the operations in order of their applying in format a_i, b_i, c_i , where a_i, b_i — pair of the leaves that are chosen in the current operation ($1 \leq a_i, b_i \leq n$), c_i ($1 \leq c_i \leq n, c_i = a_i$ or $c_i = b_i$) — choosen leaf that is removed from the tree in the current operation.

See the examples for better understanding.

Examples

input
3 1 2 1 3
output
3 2 3 3 2 1 1

input
5 1 2 1 3 2 4 2 5
output
9 3 5 5 4 3 3 4 1 1 4 2 2