

Problem J. Into Cactus

Input file: *standard input*
Output file: *standard output*
Time limit: 1 second
Memory limit: 512 mebibytes

Given a tree, add as many edges as possible so that the resulting graph is a cactus graph.

A cactus graph is a graph where each edge is contained in at most one simple cycle. This graph may not contain self-loops or parallel edges.

Input

The first line contains an integer N , the size of the tree ($1 \leq N \leq 200\,000$).

Each of the next $N - 1$ lines contains two integers u and v ($1 \leq u, v \leq N$, $u \neq v$), indicating that there is an edge between nodes u and v . It is guaranteed that the resulting graph is a tree.

Output

On the first line, output K , the maximum number of edges that can be added to the graph. On each of the next K lines, output two integers a and b ($1 \leq a, b \leq N$, $a \neq b$), indicating that you are going to add an edge between nodes a and b . The resulting graph must be a cactus graph.

If there are several solutions with the maximum possible K , output any one of them.

Example

standard input	standard output
6	2
6 4	2 1
3 1	3 5
3 6	
4 5	
2 3	