

## Problem X. Vertex Cover

Input file: Standard Input  
Output file: Standard Output  
Time limit: 0.2-0.6 second  
Memory limit: 256 megabytes

You are given an unweighted, undirected tree. Write a program to find a vertex set of minimum size in this tree such that each edge has as least one of its end-points in that set.

### Input

The first line of the input file contains one integer  $N$  — number of nodes in the tree ( $0 < N \leq 100000$ ). Next  $N-1$  lines contain  $N-1$  edges of that tree — Each line contains a pair  $(u, v)$  means there is an edge between node  $u$  and node  $v$  ( $1 \leq u, v \leq N$ ).

### Output

Print number of nodes in the satisfied vertex set on one line.

### Sample input and output

Standard Input	Standard Output
3 1 2 1 3	1

## Problem Y. Is it a tree?

Input file: Standard Input  
Output file: Standard Output  
Time limit: 1 second  
Memory limit: 256 megabytes

You are given an unweighted, undirected graph. Write a program to check if it's a tree topology.

### Input

The first line of the input file contains two integers  $N$  and  $M$  — number of nodes and number of edges in the graph ( $0 < N \leq 10000$ ,  $0 \leq M \leq 20000$ ). Next  $M$  lines contain  $M$  edges of that graph — Each line contains a pair  $(u, v)$  means there is an edge between node  $u$  and node  $v$  ( $1 \leq u, v \leq N$ ).

### Output

Print *YES* if the given graph is a tree, otherwise print *NO*.

### Sample input and output

Standard Input	Standard Output
3 2 1 2 2 3	YES
3 3 1 2 2 3 3 1	NO

## Problem Z. Longest path in a tree

Input file: Standard Input  
Output file: Standard Output  
Time limit: 1 second  
Memory limit: 256 megabytes

You are given an unweighted, undirected tree. Write a program to output the length of the longest path (from one node to another) in that tree. The length of a path in this case is number of edges we traverse from source to destination.

### Input

The first line of the input file contains one integer  $N$  — number of nodes in the tree ( $0 < N \leq 10000$ ). Next  $N-1$  lines contain  $N-1$  edges of that tree — Each line contains a pair  $(u, v)$  means there is an edge between node  $u$  and node  $v$  ( $1 \leq u, v \leq N$ ).

### Output

Print the length of the longest path on one line.

### Sample input and output

Standard Input	Standard Output
3 1 2 2 3	2