

## Problem A. Two Trees

Input file: *standard input*  
Output file: *standard output*  
Time limit: 8 seconds  
Memory limit: 256 mebibytes

Given are trees  $T_1$  and  $T_2$ . Each tree has  $n$  vertices numbered from 1 through  $n$ . Let  $d(v, u, T)$  denote the number of edges on the path between vertices  $v$  and  $u$  in tree  $T$ . Calculate the following sum:

$$\sum_{v=1}^n \sum_{u=1}^n (d(v, u, T_1) + d(v, u, T_2))^2.$$

As the answer may be large, find it modulo  $2^{32}$ .

### Input

The first line contains one integer  $n$ : the number of vertices in each tree ( $1 \leq n \leq 100\,000$ ).

Each of the next  $n - 1$  lines contains two integers,  $u$  and  $v$ , denoting an edge between vertices  $u$  and  $v$  in tree  $T_1$  ( $1 \leq u, v \leq n$ ).

Each of the last  $n - 1$  lines contains two integers,  $u$  and  $v$ , denoting an edge between vertices  $u$  and  $v$  in tree  $T_2$  ( $1 \leq u, v \leq n$ ).

### Output

Print the answer modulo  $2^{32}$ .

### Examples

<i>standard input</i>	<i>standard output</i>
3 1 2 1 3 1 2 1 3	24
3 1 2 1 3 1 2 2 3	22