IOITC 2016 Practice Test Day 4

Tree Orientation

You are given an undirected, unweighted tree. Orientation refers to the process of orienting every edge on this tree: that is, taking every existing undirected edge (u, v) and giving it a direction, either $u \to v$ or $u \leftarrow v$.

The score of an Orientation refers to the number of pairs of vertices, u and v, $u \neq v$, such that v is reachable from u.

You have to output the minimum and maximum possible scores.

Input

The first line of the input gives a single integer n, the number of vertices. The $n - 1$ lines that follow describe the edges. Each such line holds two integers, u and v, which indicate that there is an edge between the two vertices.

Output

Two integers should be printed to the first and only line of the output. The first number should be the minimum and the second - the maximum number of pairs of vertices which could remain connected (though in one direction only) after the edges are Oriented.

Test Data

Subtask 1 (30 Points): $1 \leq n \leq 100$

Subtask 2 (30 Points): $1 \leq n \leq 10000$

Subtask 3 (40 Points): $1 \leq n \leq 250000$

Sample Input1

```
4
1 2
1 3
1 4
```

Sample Output1

```
3 5
```

Sample Input2

```
8
1 2
2 3
3 4
4 5
5 6
6 7
7 8
```

Sample Output2

```
7 28
```

Limits

Time: 2 seconds

Memory: 256 MB