

Contest Duration: 2025-12-27(Sat) 23:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251227T2100&p1=248>) - 2025-12-28(Sun) 00:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251227T2240&p1=248>) (local time) (100 minutes)

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F - Sum of Mex

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 525 points

Problem Statement

You are given a tree T with N vertices. The vertices are numbered from 0 to $N - 1$, and the i -th edge ($1 \leq i \leq N - 1$) bidirectionally connects vertices u_i and v_i . (Note that vertex numbers are 0-indexed and edge numbers are 1-indexed.)

For a pair of integers (i, j) where $0 \leq i, j < N$, define $f(i, j)$ as follows:

- The vertex number of the vertex with the smallest number among the vertices **not included** in the path from vertex i to vertex j in tree T .
 - Here, if the path from vertex i to vertex j includes all vertices from vertex 0 to vertex $N - 1$, let $f(i, j) = N$.

Note that the path from vertex i to vertex j in tree T includes vertices i and j .

Find the value of $\sum_{0 \leq i < j < N} f(i, j)$.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $0 \leq u_i < v_i < N$
- The graph given in the input is a tree.
- All input values are integers.

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Input

The input is given from Standard Input in the following format:

```
 $N$   
 $u_1$   $v_1$   
 $u_2$   $v_2$   
 $\vdots$   
 $u_{N-1}$   $v_{N-1}$ 
```

Output

Output the value of $\sum_{0 \leq i \leq j < N} f(i, j)$.

Sample Input 1

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```
2  
0 1
```

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Sample Output 1

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```
3
```

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We have $f(0, 0) = 1$, $f(0, 1) = 2$, $f(1, 1) = 0$. Thus, output $1 + 2 + 0 = 3$.

Sample Input 2

[Copy](#)

```
5  
0 1  
0 2  
2 3  
2 4
```

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Sample Output 2

[Copy](#)

```
16
```

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Sample Input 3

[Copy](#)

```
7
1 4
2 6
0 5
0 3
2 5
1 5
```

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Sample Output 3

[Copy](#)

```
16
```

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