Matchings

Time limit: 2.0s **Memory limit:** 16M

In an undirected graph, a matching is a subset of the edges of the graph such that each vertex of the graph is adjacent to at most one of the selected edges. The maximum matching is a matching of maximum possible cardinality.

You are given a tree with N nodes. Your task is to find the size of the maximum matching and the number of maximum matchings (the latter one modulo M).

Constraints

$1 \leq N \leq 1.5 \times 10^6$

$1 \leq M \leq 10^9$

Subtask 1 [1%]

$1 \leq N \leq 10$

Subtask 2 [4%]

$1 \leq N \leq 10^3$

Subtask 3 [10%]

$1 \leq N \leq 5 \times 10^4$

Subtask 4 [15%]

$1 \leq N \leq 3 \times 10^5$

Subtask 5 [15%]

$1 \leq N \leq 4 \times 10^5$

Subtask 6 [15%]

$1 \leq N \leq 7 \times 10^5$

Subtask 7 [15%]

$1 \leq N \leq 9 \times 10^5$

Subtask 8 [25%]

No additional constraints.

Input Specification

The first line of input contains an integer N that denotes the number of nodes of the tree. The nodes are numbered 1 through N.

The following $N-1$ lines contain a description of the tree edges. Each of the lines contains two integers a and b that represent an edge connecting the nodes a and b.

The last line of input contains an integer M.

Output Specification

The first line of output should contain the cardinality of the maximum matching in the tree.

The second line should contain the number of maximum matchings modulo M.

Sample Input

```
5
1 2
3 2
4 5
1 4
17
```

Sample Output

```
2
3
```