Tree Records

For an array of N positive integers A, we define $\text{Records}(A)$ as an array N positive integers where $\text{Records}(A)[i] = A[i]$ if $A[j] < A[i]$ for all $1 \le j < i$, otherwise 0. For example, if $A = [2, 1, 2, 4]$, then $\text{Records}(A) = [2, 0, 0, 4]$.

You are given a tree of N nodes numbered from 1 to N and a positive integer B. Let $P(u, v)$ denote the sequence of nodes on the path from u to v, and $R(u, v) = \text{Records}(P(u, v))$.

Find the value of the following expression modulo $998\,244\,353$:

$$\sum_{u=1}^{N} \sum_{v=1}^{N} \sum_{i=1}^{|R(u,v)|} R(u, v)[i] \cdot B^{i-1}$$

Input

Read the input from the standard input in the following format:

- line 1: N B
- line $1 + i$ $(1 \le i < N)$: u v, denoting an edge between node u and v.

Output

Write the output to the standard output in the following format:

- line 1: the answer to the expression modulo $998\,244\,353$.

Constraints

- $1 \le N \le 100\,000$
- $1 \le B < 998\,244\,353$

Subtasks

1. (9 points) $N \le 2000$
2. (13 points) $B = 1$
3. (18 points) Every node of the tree has degree at most 2. In other words, the tree is a line.
4. (23 points) If the tree is rooted at node N, each node will have an index lower than its parent's index.

5. (37 points) No further constraints.

Examples

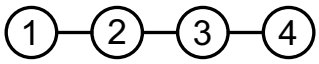
Example 1

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

The correct output is:

```
70
```

The tree looks like this:



This is the contribution of each path to the answer:

$u\backslash v$	1	2	3	4
1	1	3	6	10
2	2	2	5	9
3	3	3	3	7
4	4	4	4	4

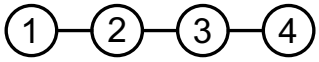
Example 2

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

The correct output is:

```
144
```

The tree looks like this:



This is the contribution of each path to the answer:

$u\backslash v$	1	2	3	4
1	1	5	17	49
2	2	2	8	24
3	3	3	3	11
4	4	4	4	4

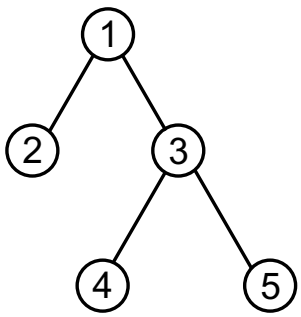
Example 3

```
5 998244352
1 2
1 3
3 4
3 5
```

The correct output is:

```
69
```

The tree looks like this:



Consider the path $(4, 5)$ for example. $P(4, 5) = [4, 3, 5]$ and $R(4, 5) = [4, 0, 5]$. So, the contribution by this path is, $4 \cdot 998\,244\,352^0 + 0 \cdot 998\,244\,352^1 + 5 \cdot 998\,244\,352^2 \equiv 4 + 0 + 5 \equiv 9 \mod 998\,244\,353$