NOI '22 Multi-Provincial Team Selection P2 - Tree

Tommy has an unrooted tree of n nodes numbered $1, 2, \ldots, n$. He wishes to assign weights to **all nodes on some nonempty path on this tree** such that the weight w_i of a node i **on this path** satisfies $l_i \leq w_i \leq r_i$ for given $[l_1, r_1], [l_2, r_2], \ldots, [l_n, r_n]$. Tommy has a positive integer K and further requests that the maximum absolute difference of the weight of any two nodes **on this path** is less than or equal to K.

1. How many such assignments satisfy these constraints?
2. What is the sum of the sum of the weights over all such assignments?

Output the answer modulo $10^9 + 7$.

Constraints

$1 \leq n \leq 200$

$1 \leq l_i \leq r_i \leq 10^9$

$1 \leq K \leq 10^9$

70% of points are awarded for the first question and 30% of points are awarded for the second question.

Test	$n \leq$	$r_i, K \leq$	Properties
1	5	10	None
2-3	30	10^9	None
4	30	500	None
5-6	200	2×10^5	None
7-8	200	10^9	For $1 \leq i < n$, there is an edge between i and $i + 1$.
9-10	200	10^9	None

Input Specification

The first line contains two integers n, K.

The i-th of the following n lines contains two integers l_i, r_i.

The following $n - 1$ lines describe the edges of the tree.

Output Specification

On the first line, output the answer for the first question.

On the second line, output the answer for the second question.

Please output exactly two integers, as otherwise your submission could be graded as Presentation Error.

Sample Input

```
3 1
2 3
3 5
4 6
1 2
1 3
```

Sample Output

```
14
78
```

Attachments