

Rooted Tree

Русский \| []

You are given a rooted tree with N nodes and the root of the tree, R , is also given. Each node of the tree contains a value, that is initially empty. You have to maintain the tree under two operations:

1. Update Operation
2. Report Operation

Update Operation

Each Update Operation begins with the character **U**. Character **U** is followed by 3 integers T , V and K . For every node which is the descendent of the node T , update it's value by adding $V + d * K$, where V and K are the parameters of the query and d is the distance of the node from T . Note that V is added to node T .

Report Operation

Each Report Operation begins with the character **Q**. Character **Q** is followed by 2 integers, A and B . Output the sum of values of nodes in the path from A to B modulo $(10^9 + 7)$

Input Format

The first Line consists of 3 space separated integers, $N \ E \ R$, where N is the number of nodes present, E is the total number of queries (update + report), and R is root of the tree.

Each of the next $N-1$ lines contains 2 space separated integers, X and Y (X and Y are connected by an edge).

Thereafter, E lines follows: each line can represent either the Update Operation or the Report Operation.

- *Update Operation* is of the form : $U \ T \ V \ K$.
- *Report Operation* is of the form : $Q \ A \ B$.

Output Format

Output the answer for every given report operation.

Constraints

- $1 \leq N, E \leq 10^5$
- $1 \leq E \leq 10^5$
- $1 \leq R, X, Y, T, A, B \leq N$
- $1 \leq V, K \leq 10^9$
- $X \neq Y$

Sample Input

```
7 7 1
1 2
2 3
2 4
2 5
5 6
6 7
U 5 10 2
U 4 5 3
Q 1 7
U 6 7 4
Q 2 7
Q 1 4
Q 2 4
```

Sample Output

```
36
54
5
5
```

Explanation

- Values of Nodes after **U 5 10 2**: **[0 0 0 0 10 12 14]**.
- Values of Nodes after **U 4 5 3**: **[0 0 0 5 10 12 14]**.
- Sum of the Nodes from 1 to 7: $0 + 0 + 10 + 12 + 14 = 36$.
- Values of Nodes after **U 6 7 4**: **[0 0 0 5 10 19 25]**.
- Sum of the Nodes from 2 to 7: $0 + 10 + 19 + 25 = 54$.
- Sum of the Nodes from 1 to 4: $0 + 0 + 5 = 5$.
- Sum of the Nodes from 2 to 4: $0 + 5 = 5$.