# **Assignment 3**

# **Problem A**

# **Problem Description**

Given a rooted binary tree from 1 to n, the root node of the tree is node 1. You are asked to print the parent node of every node in the binary tree.

#### Input

The first line contains one integer n ( $1 \le n \le 500000$ ), indicating the number of tree nodes.

Then n-1 lines follow. Each line contains two integers u,v  $(1 \le u,v \le n)$  are the indices of nodes that form an edge. u is the parent of v.

#### Output

An array containing n integers, the  $i^{th}$  element of which represents the parent node of nodes from 1 to n in order in the binary tree. Note that for node 1, which is the root node of the tree, the parent should output -1

#### Sample input

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

# Sample output

```
-1 1 1 3 3 2
```

#### **Problem B**

# **Problem Description**

Given a rooted tree numbered from 1 to n, each edge has a weight w. The root node of the tree is node 1. You are asked to calculate the number of paths that start from the root, terminate in a leaf node, and satisfy the sum of edge weights in the path equals to num.

#### Input

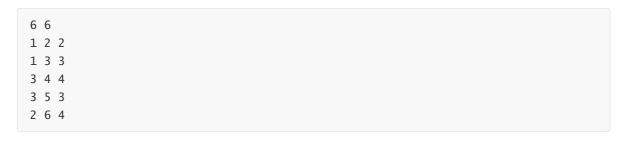
The first line contains two integers n and num  $(1 \le n \le 500000, 1 \le num \le 2000000000)$ , indicating the number of tree nodes and the target number.

Then n-1 lines follow. Each line contains three integers u,v,w  $(1 \le u,v \le n,1 \le w \le 100)$  describing an edge. The first two integers are the indices of nodes that form an edge and the last integer indicates the weight of the edge.

#### **Output**

Output an integer which means how many paths satisfying the sum of edge weights in the path equals to num.

#### Sample input



### Sample output

2

# Requirement as homework

- 1. You need to accomplish the ToDO in Parents.java, Paths.java. Please **don't modify** the function name or return value. But you need to define the parameters that are passed to the function.
- Please explain your algorithm and analyze its time complexity correctly in a file, which
  must be .pdf file. (It's OK to write in Chinese.)
   If the complexity analysis does not correspond to the algorithm you wrote, you will lose
  some points.
- 3. In this assignment, two sets of data are provided for each problem, but we will use other data to verify the correctness of your code.
- 4. Please submit Parents.java, Paths.java, explanation file as a .zip file.