**Height**

Cats like to sit in high places. It is not uncommon to see cats climbing trees or furniture in order to lie on the top-most area within their feline reach. Rar the Cat is no exception. However, he does not know how high is one area relative to another.

Height can be measured in centimeters (cm) above sea level but Rar the Cat does not know the absolute height of any place. However, he knows that area will be higher than area by centimetres because he needs to jump to get from area to . There will be areas in total with such descriptions. Areas are labelled from to **.**

Rar the Cat also has queries, each consisting integers and. He wants to know the height of area with respect to area . In the event that area is lower than area , please output a negative number. Otherwise, output a positive number.

It is guaranteed that the relative heights of all pairs of areas can be computed from the data provided in the input. To be precise, the graph provided will be connected and has N-1 edges connecting N vertices in total.

## Input

The first line of input will contain a single integer N

The following lines of input will contain 3 integers each, with the line containing , and (

The next line will contain a single integer,

The following lines will contain 2 integers each, and

## Output

For each line of query, you are supposed to output the relative heights of area compared to area , in centimeters, one line per query.

## Examples

|  |  |
| --- | --- |
| Input (height1.in) | Output (height1.out) |
| 5  2 3 5  4 2 2  4 1 3  5 2 10  3  1 2  3 5  1 3 | -1  -15  4 |

## Explanation:

Area 1 is 3 centimeters above Area 4 while Area 2 is 2 centimeters above Area 4. Hence, Area 2 is 1 centimeters below Area 1.

Area 2 is 10 centimeters above Area 5. Area 3 is 5 centimeters above Area 2 and hence 15 centimeters above Area 5. As such, Area 5 is 15 centimeters below Area 3.

From the first query, Area 2 is 1 centimeters below Area 1. Area 3 is 5 centimeters above Area 2. As such, Area 3 is 4 centimeters above Area 1.

## Note:

1. A skeleton file has been given to help you. You should not create a new file or rename the file provided. You should develop your program using this skeleton file.
2. You are free to define your own helper methods and classes (or remove existing ones) if it is suitable but you must put all the new classes, if any, in the same skeleton file provided

## Skeleton File

You can find the skeleton file Height.java in the lab package.