IOI '09 P7 - Regions

Time limit: 7.0s **Memory limit:** 128M

The United Nations Regional Development Agency (UNRDA) has a very well defined organizational structure. It employs a total of N people, each of them coming from one of R geographically distinct regions of the world. The employees are numbered from 1 to N inclusive in order of seniority, with employee number 1, the Chair, being the most senior. The regions are numbered from 1 to R inclusive in no particular order. Every employee except for the Chair has a single supervisor. A supervisor is always more senior than the employees he or she supervises.

We say that an employee A is a manager of employee B if and only if A is B's supervisor or A is a manager of B's supervisor. Thus, for example, the Chair is a manager of every other employee. Also, clearly no two employees can be each other's managers.

Unfortunately, the United Nations Bureau of Investigations (UNBI) recently received a number of complaints that the UNRDA has an imbalanced organizational structure that favors some regions of the world more than others. In order to investigate the accusations, the UNBI would like to build a computer system that would be given the supervision structure of the UNRDA and would then be able to answer queries of the form: given two different regions r_1 and r_2, how many pairs of employees e_1 and e_2 exist in the agency, such that employee e_1 comes from region r_1, employee e_2 comes from region r_2, and e_1 is a manager of e_2. Every query has two parameters: the regions r_1 and r_2; and its result is a single integer: the number of different pairs e_1 and e_2 that satisfy the above-mentioned conditions.

Task

Write a program that, given the home regions of all of the agency's employees, as well as data on who is supervised by whom, interactively answers queries as described above.

Constraints

$1 \leq N \leq 200\,000$ The number of employees
$1 \leq R \leq 25\,000$ The number of regions
$1 \leq Q \leq 200\,000$ The number of queries your program will have to answer
$1 \leq H_k \leq R$ The home region of employee k (for $1 \leq k \leq N$)
$1 \leq S_k < k$ The supervisor of employee k (for $2 \leq k \leq N$)
$1 \leq r_1, r_2 \leq R$ The regions inquired about in a given query

Input Specification

Your program must read from standard input the following data:

- The first line contains the integers N, R and Q, in order, separated by single spaces.
- The next N lines describe the N employees of the agency in order of seniority. The kth of these N lines describes employee number k. The first of these lines (i.e., the one describing the Chair) contains a single integer: the home region H_1 of the Chair. Each of the other $N-1$ lines contains two integers separated by a single space: employee k's supervisor S_k, and employee k's home region H_k.

Interaction

After reading the input data, your program must start alternately reading queries from standard input and writing query results to standard output. The Q queries must be answered one at a time; your program must send the response to the query it has already received before it can receive the next query.

Each query is presented on a single line of standard input and consists of two different integers separated by a single space: the two regions r_1 and r_2. The response to each query must be a single line on standard output containing a single integer: the number of pairs of UNRDA employees e_1 and e_2, such that e_1's home region is r_1, e_2's home region is r_2 and e_1 is a manager of e_2.

NOTE: The test data will be such that the correct answer to any query given on standard input will always be less than $1\,000\,000\,000$.

IMPORTANT NOTE: In order to interact properly with the grader, your program needs to flush standard output after every query response.

Grading

For a number of tests, worth a total of 30 points, R will not exceed 500.
For a number of tests, worth a total of 55 points, no region will have more than 500 employees.
The tests where both of the above conditions hold are worth 15 points. The tests where at least one of the two conditions holds are worth 70 points.

Sample Input

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

Sample Output

```
1
3
2
1
```