

Hello sampreet!
Account or Log Out

PRACTICE

COMPETE

DISCUSS

COMMUNITY

HELP

ABOUT

Home » Compete » April Cook-Off 2016 » Queries on a Binary Tree

Queries on a Binary Tree

Problem code: BINTREEQ

Tweet

Like

Share

One person likes this. Be the first of your friends.

ALL SUBMISSIONS

MY SUBMISSIONS

All submissions for this problem are available.

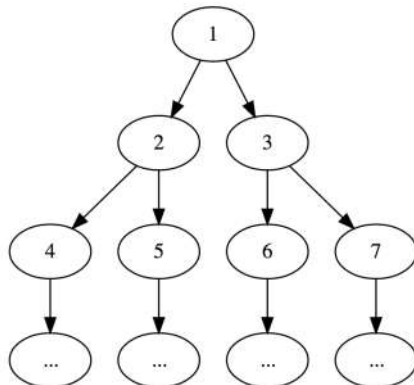
SUCCESSFUL SUBMISSIONS

Read problems statements in [Mandarin Chinese](#), [Russian](#) and [Vietnamese](#) as well.

Let's consider a rooted binary tree with the following properties:

- The number of nodes and edges in the tree is infinite
- The tree root is labeled by 1
- A node labeled by v has two children: $2 \times v$ (the left son of v) and $2 \times v + 1$ (the right son of v)

Here is an image of the first several tree layers of such a tree:



Let's consider four operations, that are allowed to apply during the tree traversal:

- **move to the left son** - move from v to $2 \times v$
- **move to the right son** - move from v to $2 \times v + 1$
- **move to the parent as a left son** - move from v to $v / 2$ if v is an even integer
- **move to the parent as a right son** - move from v to $(v - 1) / 2$ if v is an odd integer

It can be proven, that for any pair of two nodes u and v , there is only one sequence of such commands, that moves from u to v and visits each node of the tree at most once. Let's call such a sequence of commands a *path configuration* for a pair of nodes (u, v) .

You are asked to process a series of the following queries:

You are given three integers n , u and v ($1 \leq u, v \leq n$). Count the pairs of nodes (w, t) ($1 \leq w, t \leq n$) such that the path configuration for (w, t) is the same with the path configuration for (u, v) .

Input

The first line of input contains an integer Q denoting the number of queries to process.

Each of the next Q lines contains three space-separated integers n , u and v denoting a query.

Output

For each query, print the answer on a separate line.

Constraints

- $1 \leq Q \leq 20000$
- $1 \leq u, v \leq n \leq 10^9$

Example

Input:

```

3
11 9 11
10 2 2
8 1 8
  
```

Output:

```

Output:
2
10
1

```

Explanation

In the first query from the example test case, you should count pairs (5, 7) and (9, 11).

In the second query from the example test case, you should count the following pairs: (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6), (7, 7), (8, 8), (9, 9) and (10, 10).

In the third query from the example test case, you should only count a pair (1, 8).

Author:	kostya_by
Tester:	pavel1996
Editorial:	http://discuss.codechef.com/problems/BINTREEQ
Tags:	cook69 easy kostya_by lca
Date Added:	26-03-2016
Time Limit:	1 sec
Source Limit:	50000 Bytes
Languages:	ADA, ASM, BASH, BF, C, C99 strict, CAML, CLOJ, CLPS, CPP 4.3.2, CPP 4.9.2, CPP14, CS2, D, ERL, FORT, FS, GO, HASK, ICK, ICON, JAVA, JS, LISP clisp, LISP sbcl, LUA, NEM, NICE, NODEJS, PAS fpc, PAS gpc, PERL, PERL6, PHP, PIKE, PRLG, PYPY, PYTH, PYTH 3.1.2, RUBY, SCALA, SCM chicken, SCM guile, SCM qobi, ST, TCL, TEXT, WSPC

Comments ▸

[CodeChef is a non-commercial competitive programming community](#)

[About CodeChef](#) | [About Directi](#) | [CEO's Corner](#) | [C-Programming](#) | [Programming Languages](#) | [Contact Us](#)

© 2009 Directi Group . All Rights Reserved. CodeChef uses SPOJ © by Sphere Research Labs
In order to report copyright violations of any kind, send in an email to copyright@codechef.com

Directi
Intelligent People. Unlimited Ideas.

The time now is: 05:18:10 PM
Your IP : 14.139.196.3

CodeChef - A Platform for Aspiring Programmers

CodeChef was created as a platform to help programmers make it big in the world of algorithms, **computer programming** and **programming contests**. At CodeChef we work hard to revive the geek in you by hosting a **programming contest** at the start of the month and another smaller programming challenge in the middle of the month. We also aim to have training sessions and discussions related to **algorithms**, **binary search**, technicalities like **array size** and the likes. Apart from providing a platform for **programming competitions**, CodeChef also has various algorithm tutorials and forum discussions to help those who are new to the world of **computer programming**.

Practice Section - A Place to hone your 'Computer Programming Skills'

Try your hand at one of our many practice problems and submit your solution in a language of your choice. Our **programming contest** judge accepts solutions in over 35+ programming languages. Preparing for coding contests were never this much fun! Receive points, and move up through the CodeChef ranks. Use our practice section to better prepare yourself for the multiple **programming challenges** that take place through-out the month on CodeChef.

Compete - Monthly Programming Contests and Cook-offs

Here is where you can show off your **computer programming** skills. Take part in our 10 day long monthly **coding contest** and the shorter format Cook-off **coding contest**. Put yourself up for recognition and win great prizes. Our **programming contests** have prizes worth up to INR 20,000 (for Indian Community), \$700 (for Global Community) and lots more CodeChef goodies up for grabs.

Programming Tools

[Online IDE](#)

[Upcoming Coding Contests](#)

[Contest Hosting](#)

[Problem Setting](#)

[CodeChef Tutorials](#)

[CodeChef Wiki](#)

Practice Problems

[Easy](#)

[Medium](#)

[Hard](#)

[Challenge](#)

[Peer](#)

[School](#)

[FAQ's](#)

Initiatives

[Go for Gold](#)

[CodeChef for Schools](#)

[Campus Chapters](#)