# 6086 Dirichlet's Theorem

Dirichlet's theorem on arithmetic progressions states that for any two positive integers $a$ and $b$, if $gcd(a, b) = 1$ then the arithmetic progression $t(n) = a * n + b$ $(n \geq 0)$ contains infinitely many prime numbers. Recall that a prime number is a positive integer $\geq 2$ that has no divisors other than 1 and itself.

For example, if $a = 4$ and $b = 3$, then the arithmetic progression is

$$3, 7, 11, 15, 19, 23, 27, 31, 35, \ldots,$$

and it can be seen that many prime numbers are contained in the first part of this list. Given arbitrary integers $a > 0$, $b \geq 0$, and $U \geq L \geq 0$, your job is to count how many values of $t(n) = a * n + b$ are prime, where $L \leq n \leq U$.

## Input

The input consists of a number of cases. The input for each case is specified by the four integers $a$, $b$, $L$, and $U$ on a line. You may assume that $a * U + b \leq 10^{12}$ and $U - L \leq 10^6$. A line containing a single '0' indicates the end of input.

## Output

For each test case, print:

Case *xxx*: *yyy*

where $xxx$ is the case number (starting from 1), and $yyy$ is the number of $t(n)$, $L \leq n \leq U$, that are prime.

## Sample Input

```
4 3 0 8
1 0 2 100
2 7 0 1000
0
```

## Sample Output

```
Case 1: 6
Case 2: 25
Case 3: 301
```