Congruence modulo

Time limit: 1 second
Memory limit: 2048 megabytes

In this program, you will receive four integer numbers (**a**, **b**, **c**, **m**), and your task is to show all integers between **a** and **b** that are congruent with **c** modulo **m**. (**x** ≡ **c** (mod **m**), **a** <= **x** <= **b**). For example, 50 ≡ 34 (mod 2). Take test case1 for example, between range 4 to 15, we can find 5, 10, 15 which mod 5 equal to 0.

Hint: You'd better make sure whether the number is positive or negative.

- **Input Format**
  The first line has four integers **a, b, c,** and **m**.

- **Output Format**
  All integers between **a** and **b** that are congruent with **c** modulo **m**.

- **Technical Specifications**
  - $-500 \leq a, \ b, c \ \leq 500$
  - $0 \leq m \leq 500$

Input	Output
4 15 0 5	5 10 15
1 10 1 3	1 4 7 10
-12 24 5 8	-11 -3 5 13 21

Reference:

Congruence [edit]

Given an integer $n > 1$, called a **modulus**, two integers a and b are said to be **congruent** modulo n, if n is a divisor of their difference (i.e., if there is an integer k such that $a - b = kn$).

Congruence modulo n is a congruence relation, meaning that it is an equivalence relation that is compatible with the operations of addition, subtraction, and multiplication. Congruence modulo n is denoted:

$$a \equiv b \pmod{n}.$$

The parentheses mean that $(\mathrm{mod}\ n)$ applies to the entire equation, not just to the right-hand side (here b). This notation is not to be confused with the notation $b \bmod n$ (without parentheses), which refers to the modulo operation. Indeed, $b \bmod n$ denotes the unique integer a such that $0 \leq a < n$ and $\boldsymbol{a \equiv b \ (\mathrm{mod}\ n)}$ (i.e., the remainder of $\boldsymbol{b}$ when divided by $\boldsymbol{n}$).

The congruence relation may be rewritten as

$$a = kn + b,$$

explicitly showing its relationship with Euclidean division. However, the b here need not be the remainder of the division of a by n. Instead, what the statement $a \equiv b \ (\mathrm{mod}\ n)$ asserts is that a and b have the same remainder when divided by n. That is,

$$a = pn + r,$$
$$b = qn + r,$$

where $0 \leq r < n$ is the common remainder. Subtracting these two expressions, we recover the previous relation:

$$a - b = kn,$$

by setting $k = p - q$.

Examples [edit]

In modulus 12, one can assert that:

$$38 \equiv 14 \pmod{12}$$

because $38 - 14 = 24$, which is a multiple of 12. Another way to express this is to say that both 38 and 14 have the same remainder 2, when divided by 12.

The definition of congruence also applies to negative values. For example:

$$\begin{aligned} 2 &\equiv -3 \pmod{5} \\ -8 &\equiv 7 \pmod{5} \\ -3 &\equiv -8 \pmod{5}. \end{aligned}$$