Extra for Those who got 5 points out of 10 on Timed Midterm Problem 1
DO TUESDAY Nov 9, NO DEAD CAT
Recommend that everyone does it

(5 points on problem 1 on the midterm if you have 5 points on it already)

Write a program that does the following:

1. Input is 3 numbers $a, b, m \in N$. Our intent is to consider

$$f(x) = ax + b \pmod{m}$$

   as an affine cipher.

2. If any of $a, b, m < 0$ then output exactly "BAD INPUT: Negative Number". And then halt.

3. If $a = 0$ output exactly "BAD INPUT: a is 0". And then halt.

4. If $m = 0$ output exactly "BAD INPUT: m is 0". And then halt.

5. If $m = 1$ output exactly "BAD INPUT: m is 1". And then halt.

6. (This is a comment, not part of the program.) If you got here then $f(x) = ax + b \pmod{m}$ is a plausible affine function unless a and m are NOT rel prime.

7. Determine if a, m are relatively prime.

   (a) If so then output the c, d of the INVERSE function of form $f'(x) = cx + d \pmod{m}$ that Bob would use to DECODE.

   You should output "c,d", with c and d separated by a comma on one line. See the sample inputs/outputs for clarification.

   (b) If not then output any x_1, x_2 such that $f(x_1) = f(x_2)$.

   You should output "x_1,x_2", with x_1 and x_2 separated by a comma on one line. See the sample inputs/outputs for clarification.

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In your main method:

1. You should take as input a, b, m as command line arguments. Expect your filename to be the first command line argument at index 0, a to be the second at index 1, b to be the third at index 2, and m to be the third at index 3. There is no input given through standard input.

2. You should output whatever the result of running your program is through standard output.

3. You should upload a **single** file ending in `.java`, `.py`, `.ml`, `.rb`, `.c`, `.cpp`, or `.scala`, corresponding to Java, Python3, OCaml, Ruby, C, C++, and Scala respectively.

GOTO NEXT PAGE FOR SAMPLE INPUTS/OUTPUTS

Sample Inputs/Outputs:

1. Notice a is not relatively prime to m, so we output some x_1, x_2 such that $f(x_1) = f(x_2)$.

   Input:

   $a = 5, b = 3, m = 10$

   Output:

   ```
   1,3
   ```

2. a, b, m are good in this one, so we output the c, d used in the decode function.

   Input:

   $a = 5, b = 3, m = 11$

   Output:

   ```
   9,6
   ```

3. Input:

   $a = 0, b = 3, m = 11$

   Output:

   ```
   BAD INPUT: a is 0
   ```