CS410P

LAB 9L

Purpose

The purpose of this assignment is to give you practice with writing functions and for loops

Problem

In Mathematics, **the greatest common divisor** (**GCD**) of two or more integers, when at least one of them is not zero, is the largest positive integer that divides the numbers without a remainder. For example, the **GCD** of 8 and 12 is 4.

In arithmetic and number theory, the **least common multiple**, of two integers a and *b*, usually denoted by **LCM(*a, b*)**, is the smallest positive integer that is divisible by both *a* and *b*

You cannot use any library functions for GCD or LCM, you must write these functions on your own

Example of LCM:

What is the LCM of 4 and 6?
Multiples of 4 are: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, ...
Multiples of 6 are: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, ...
Common multiples of 4 and 6 are simply the numbers that are in both lists:
12, 24, 36, 48, 60, 72, ...
So, from this list of the first few common multiples of the numbers 4 and 6, their **LCM** is 12.

Write a program that accepts 2 integers from the user in the main function and calls a function to compute the GCD of the two numbers. The parameters to the function are the two integers. The result (GCD) is returned as a function return value. After printing the GCD, a function is called to compute the LCM of the two numbers and the result (LCM) is returned as a function return value of the second function.

For this lab you are given some starter code, which is just a template of how the function definitions need to be made and how the "main" function is recognized. The program consists of 2 Python files: main.py defines the starting/entry point of the program and gcd_lcm.py is the file containing functions. Download this starter program from the public folder and fill it in. Keep in mind that the file main.py is the part of the program which shows you where the "main" function is where it starts execution.

As discussed in class the concept of a "main" function is the part of the program which will be executed first. In your starter program, everything that you code under the if statement:

```
if __name__ == '__main__':
```

is considered to be the main function (simplistically speaking)

- The main function prompts the user to enter 2 positive integers.
  - If anything other than positive integers are entered, display an error message and ask them to re-enter 2 numbers (you will need to use a while loop to keep accept input if they are invalid).
- With a valid a set of inputs are valid, call the function to compute GCD (pass the two integers as arguments), result is returned via function return value.
- Print the GCD result in the main function
- Call the second function to compute LCM (pass the two integers as arguments), result is returned via function return value.
- Print the LCM result in the main function.
- Stop the program (there is no need to continuously accept numbers).

Your function MUST use a **for** loop to compute the GCD of the two numbers and return the result as a function return value. You can use any kind of logic you want to compute the LCD of two numbers (except any library function that directly computes the LCD of two numbers).

The results of the computation MUST be printed in the main function. No global variables can be used in the program, all variables used must be "local" to each function.

Inputs

Only one set of inputs are sufficient for program completion as long as they are valid inputs, meaning that you do not have to keep looping once a set of inputs have been processed.

Outputs

A message indicating the input numbers along with the GCD and LCM results should be printed. Any invalid inputs must be indicated with a proper error message (sample output is available in the public folder).

Grade Key

A	Comments (including Name, brief description about program)	**5**
B	main function: Two positive integers accepted as input, non-integers caught via an exception handler.	**15**
C	main function: function to compute GCD called with two integers, return value printed is accurate	**10**
D	main function: function to compute LCM called with two integers, return value printed is accurate	**10**
E	GCD function: For loop used to compute GCD of the two integers passed via arguments, result returned via function return	**25**
F	LCM function: compute LCM of the two integers passed via arguments (any logic can be used), result returned via function return	**25**
G	No global variables used, no code present outside of any function.	**10**