CPE 100 – Introduction to Computer Programming
International Sections - August 2020
Laboratory Exercise 3

Objective

This lab is intended to give you practice using loops. It also gives you practice with the modulus operator (%).

Instructions

Write a program called ***multiples.c*** which determines whether numbers entered by the user are exact multiples of another number. This program should loop, asking for values to check, until the user enters a -1. Then the program should print how many multiples it found. A sample run of the program is shown below. Text in red is entered by the user.

```
./multiples
Check for multiples of what number (greater than 0 and less than 10)? 3
Value to check (-1 to stop): 12
      12 is evenly divisible by 3
Value to check (-1 to stop): 5
      5 is NOT evenly divisible by 3
Value to check (-1 to stop): -240
      -240 is evenly divisible by 3
Value to check (-1 to stop): 11
      11 is NOT evenly divisible by 3
Value to check (-1 to stop): 77
      77 is NOT evenly divisible by 3
Value to check (-1 to stop): 15
      15 is evenly divisible by 3
Value to check (-1 to stop): 0
      0 is evenly divisible by 3
Value to check (-1 to stop): 1
      1 is NOT evenly divisible by 3
Value to check (-1 to stop): -1

You entered 4 values that were multiples of 3.
Goodbye!
```

After you have written the code, compile and test your program. Test that the program works correctly when you enter -1 immediately, for the first number to check. Test that the program works correctly for 2, 3, 5 and 8 as the multipliers.

Hint: this program should use a while loop.

Before you begin writing the code for this lab, create a flowchart showing the logic. Show your flowchart to the TA and get approval before starting to write the code!

Now copy **multiples.c** to a new file, **multiples2.c**.

In the new program, asks the user at the beginning how many values they want to check. Then ask for exactly this number of values. For example:

```
./multiples2
Check for multiples of what number (greater than 0 and less than 10)? 3
Check how many values? 5
Value to check: 12
      12 is evenly divisible by 3
Value to check: 5
      5 is NOT evenly divisible by 3
Value to check: -240
      -240 is evenly divisible by 3
Value to check: -1
      -1 is NOT evenly divisible by 3
Value to check: 21
      21 is evenly divisible by 3

You entered 3 values that were multiples of 3.
Goodbye!
```

Notice that entering -1 will not stop the program from asking for the next value, if there are more values left to check.

Hint: this program should use a for loop.

Before you begin writing the code for this lab, think about how your original flowchart needs to change.

If you have time, and want more of a challenge, add code to **multiples.c** that will make sure the multiplier is greater than 0 and less than 10. Keep asking until the user gives you a good value. For example:

Check for multiples of what number (greater than 0 and less than 10)? 11
Illegal value!
Check for multiples of what number (greater than 0 and less than 10)? 0
Illegal value!
Check for multiples of what number (greater than 0 and less than 10)? 7

Hint: to do this, you will need to add another while loop.

Upload your source file only (**multiples.c** and **multiples2.c**) to the server using the usual link.