

Lab 10B

Fractions

Objective:

To use functions with parameters and a menu, introducing the technique of stepwise refinement.

- Write code for a `greatestCommonFactor` function, which takes in two numbers, and returns the largest integer that evenly divides both of the integers. This function will be used in reducing fractions.
- there should be a separate function for each operation (+, -, *, /)
- there should be error checking (*Hint*: think about where you could be dividing by zero)

Assignment:

Write a menu-driven program that manipulates fractions. You should write a function for each arithmetic operation using the idea of stepwise refinement. This is “stepwise” because we are breaking the problem into more manageable pieces and dealing with each in turn. The “refinement” also comes in the output of the reduced answers. Additionally, you should have an input function that will get a fraction and check its validity (i.e., denominator not equal to zero).

Your program should ask the user to input two fractions and to select an operation (+, -, *, /). Then, it should display the problem along with the solution. The program should recognize division by zero and print an appropriate error message. It should loop until the user chooses to quit.

****Be sure to test your program with positive and negative fractions and with zeroes.****

Reduce all answers, displaying the reduced fraction only if different from the original. Do not leave a fraction with a denominator of 1.

Sample Run (continues on to next page):

```
Enter the numerator and denominator of the first fraction:  5 6
Enter the numerator and denominator of the second fraction: 1 3
```

```
Menu of Operations
Add.....1
Subtract.....2
Multiply.....3
Divide.....4
```

```
Which operation? 2
```

```

  5      1      9      1
--- - --- = --- = ---
  6      3     18      2
```

```
Another problem (y for yes, n for no)? y
```

```
Enter the numerator and denominator of the first fraction:  5 3
Enter the numerator and denominator of the second fraction: 6 5
```

Menu of Operations

Add.....1
 Subtract.....2
 Multiply.....3
 Divide.....4

Which operation? **3**

$$\begin{array}{r} 5 \\ --- \\ 3 \end{array} * \begin{array}{r} 6 \\ --- \\ 5 \end{array} = \begin{array}{r} 30 \\ --- \\ 15 \end{array} = 2$$

Another problem (y for yes, n for no)? **n**

Hint:

A possible method to find the GCF of two integers x and y:

If x is bigger than y, follow the procedure below:

x/y = some value with a remainder of r_1

y/r_1 = some value with a remainder of r_2

r_1/r_2 = some value with a remainder of r_3

r_2/r_3 = some value with a remainder of r_4

....

$r_{(n-1)}/r_n$ = some value with a remainder of ZERO!

Therefore, r_n is the GCF between x and y

Can you see the pattern?? Don't forget to figure out which number is bigger (x or y?)

Copy your completed code here and turn in on Classroom:

Don't forget you can start your own program in Replit by clicking "+Create" on the left side. Be sure to select C++ and add `using namespace std;` at the top.