**Exercise Set #04-01: Fraction**

**Date of release:** 1 September 2014

**Deadline:** 19 September 2014, 10pm  
**Objectives:** Classes

**Task statement:**

An interface is given as follows:

**// public functions**

**Fraction(int, int) // constructor, creates 1/1 by**

**// default**

**int getNumer(); // returns numerator**

**int getDenom(); // returns denominator**

**void setNumer(); // sets new numerator**

**void setDenom(); // sets new denominator**

**Fraction add(Fraction f); // returns this + f**

**Fraction minus(Fraction f); // returns this - f**

**Fraction times(Fraction f); // returns this \* f**

**Fraction simplify(); // simplifies this**

**string str(); // returns a string in the form**

**// of “numerator/denominator”**

**// (e.g., 1/2 and 3/5)**

**bool equals(Fraction f) // returns true if the two   
 // fractions are equal to each   
 // other, otherwise false**

**// private attributes**

**int numer, denom; // numerator and denominator**

**// private static function**

**int gcd(int a, int b); // returns the greatest common   
 // divisor of a and b**

Write a class **Fraction**, which consists of two files **fraction.h** and **fraction.cpp**, to implement the above interface.

A client program **testfraction.cpp** is given which performs the following:

* Read input data for two fractions and create two **Fraction** objects.
* Display the two fractions.
* Check if the two fractions are equal.
* Performs the add(), minus() and times() operations on the two fractions and display the resultant fraction of each operation.

You may assume that the numerators and denominators are non-negative, and the denominators are not zero.

You need to submit both **fraction.h** and **fraction.cpp**.

Hint 1: The keyword **this** also exists in C++. It is a **pointer** to the object on which the function is called.

Hint 2: An easy way to convert an integer to a string is to use stringstream:

* The “<<” operator can be used to add both integers and strings to a stringstream object.
* The str() function from the stringstream object can be used to create a string with the content in the stringstream object.

**Sample runs:**

Enter 1st fraction: **1 2**

Enter 2nd fraction: **3 4**

1st fraction is 1/2

2nd fraction is 3/4

The fractions are not the same.

Sum is 5/4

Difference is -1/4

Product is 3/8

Enter 1st fraction: **5 7**

Enter 2nd fraction: **15 21**

1st fraction is 5/7

2nd fraction is 15/21

The fractions are the same.

Sum is 10/7

Difference is 0/1

Product is 25/49

Enter 1st fraction: **6 8**

Enter 2nd fraction: **0 10**

1st fraction is 6/8

2nd fraction is 0/10

The fractions are not the same.

Sum is 3/4

Difference is 3/4

Product is 0/1