Practice Exercise #27: Fraction ADT (Implementation 2)

http://www.comp.nus.edu.sg/~cs1020/4_misc/practice.html

Objectives:

1. Understanding Abstract Data Type.

Task statement:

An interface **FractionI.java** is given:

```
public interface FractionI {
   public int getNumer();   // returns numerator part
   public int getDenom();   // returns denominator part
   public void setNumer(int numer);  // sets new numerator
   public void setDenom(int denom);  // sets new denominator

   public FractionI add(FractionI f);    // returns this + f
   public FractionI minus(FractionI f);  // returns this - f
   public FractionI times(FractionI f);  // returns this * f
   public FractionI divide(FractionI f); // returns this / f
   public FractionI simplify();          // simplifies this
}
```

Write a class **FractionArr** to implement the above interface. The **FractionArr** class should have an attribute which is a 2-element **int** array to represent the numerator and denominator of a fraction. It should also have a default constructor that creates a fraction 1/1. Note that **FractionArr** class can contain more methods than those listed in **FractionI** interface.

A client program **TestFractionArr.java** is given which performs the following:

- Read input data for two fractions and create two **FractionArr** objects.
- Display the two fractions.
- Check if the two fractions are equal.
- Perform the **add()**, **minus()**, **times()** and **divide()** operations on the two fractions and display the resultant fraction of each operation.
- In the case of division, if there is a division-by-zero error, throw an exception.

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

You need to submit **FractionArr.java** and **TestFractionArr.java**.

Sample runs are shown on the next page.

Sample run #1:

```
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
Quotient is 2/3
```

Sample run #2:

```
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
Quotient is 1/1
```

Sample run #3:

```
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
Division by zero error!
```