Exposure Java

Lab 09b

The Rational Class Program II

80 & 100 Point Versions

Assignment Purpose:

The purpose of this lab is to demonstrate knowledge of creating a class with object methods, instantiate multiple objects of the created class, and then call the object methods from the main program method. Additionally, this lab requires knowledge of the GUI input output and string to number conversion.

This lab assignment continues the **`Rational`** class that was started with the **`Lab09a`** assignment. Now comes the times to add, subtract, multiply and divide fractions with your **`Rational`** class. For this assignment you will need to complete the **`Rational`** class and also handle most of the code in the **`main`** method.

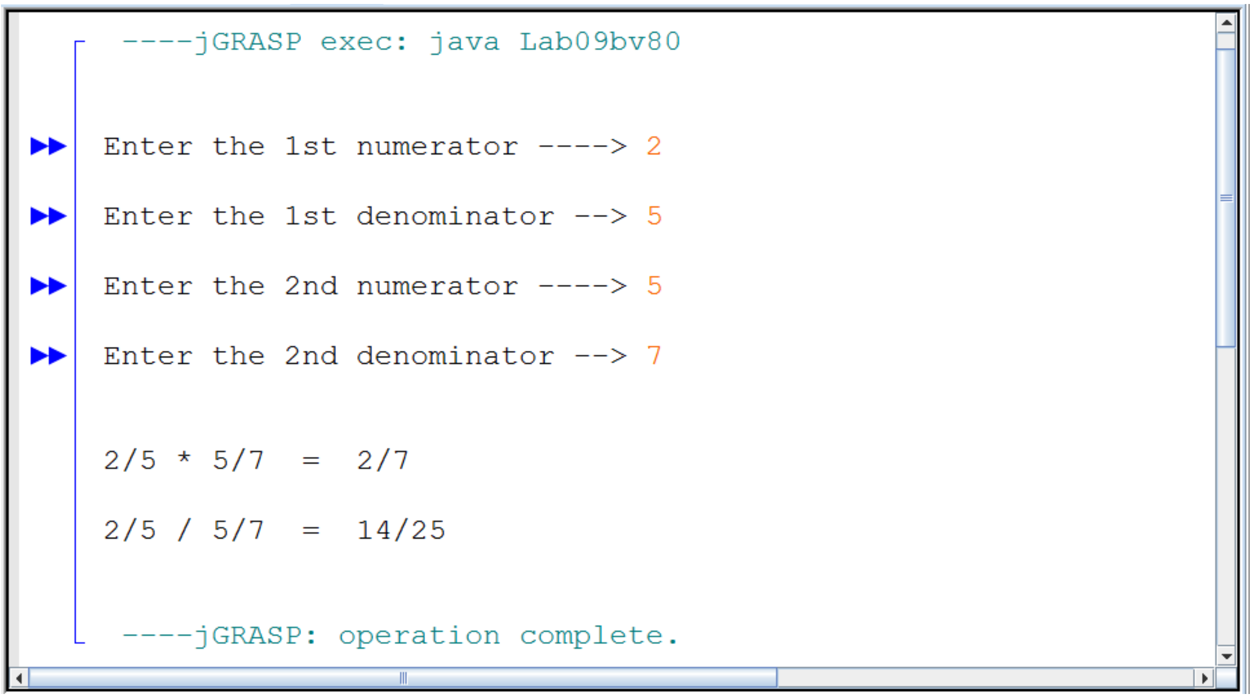
Lab09bvst Student Version	Do not copy this file, which is provided.

```
// Lab09bvst.java
// The Rational Class Program II
// This is the student, starting version of the Lab09b assignment.


import java.util.Scanner;


public class Lab09bvst
{
   private static int num1, den1;   // numerator and denominator of the 1st rational number
   private static int num2, den2;   // numerator and denominator of the 2nd rational number

   public static void main (String[] args)
   {
      enterData();

      Rational r1 = new Rational(num1,den1);
      Rational r2 = new Rational(num2,den2);
      Rational r3 = new Rational();

       r3.multiply(r1,r2);
      System.out.println("\n\n" + r1.getOriginal() + " * " + r2.getOriginal() + "  =  " + r3.getReduced());
      r3.divide(r1,r2);
      System.out.println("\n" + r1.getOriginal() + " / " + r2.getOriginal() + "  =  " + r3.getReduced());

//    100 Point Version Only
//    r3.add(r1,r2);
//    System.out.println("\n" + r1.getOriginal() + " + " + r2.getOriginal() + "  =  " + r3.getReduced());
//    r3.subtract(r1,r2);
//    System.out.println("\n" + r1.getOriginal() + " - " + r2.getOriginal() + "  =  " + r3.getReduced());
      System.out.println();
   }


   public static void enterData()
   {
      Scanner input = new Scanner(System.in);
      System.out.print("\nEnter the 1st numerator ----> ");
      num1 = input.nextInt();
      System.out.print("\nEnter the 1st denominator --> ");
      den1 = input.nextInt();
      System.out.print("\nEnter the 2nd numerator ----> ");
      num2 = input.nextInt();
      System.out.print("\nEnter the 2nd denominator --> ");
      den2 = input.nextInt();
   }
}


class Rational
{
   private int firstNum;            // entered numerator
   private int firstDen;            // entered denominator
   private int reducedNum;    // reduced numerator
   private int reducedDen;    // reduced denominator
   private int gcf;                 // greatest common factor


  private void getGCF(int n1,int n2)
  {
      int rem = 0;
      do
      {
         rem = n1 % n2;
         if (rem == 0)
            gcf = n2;
         else
         {
            n1 = n2;
           n2 = rem;
         }
      }
      while (rem != 0);
   }

}
```

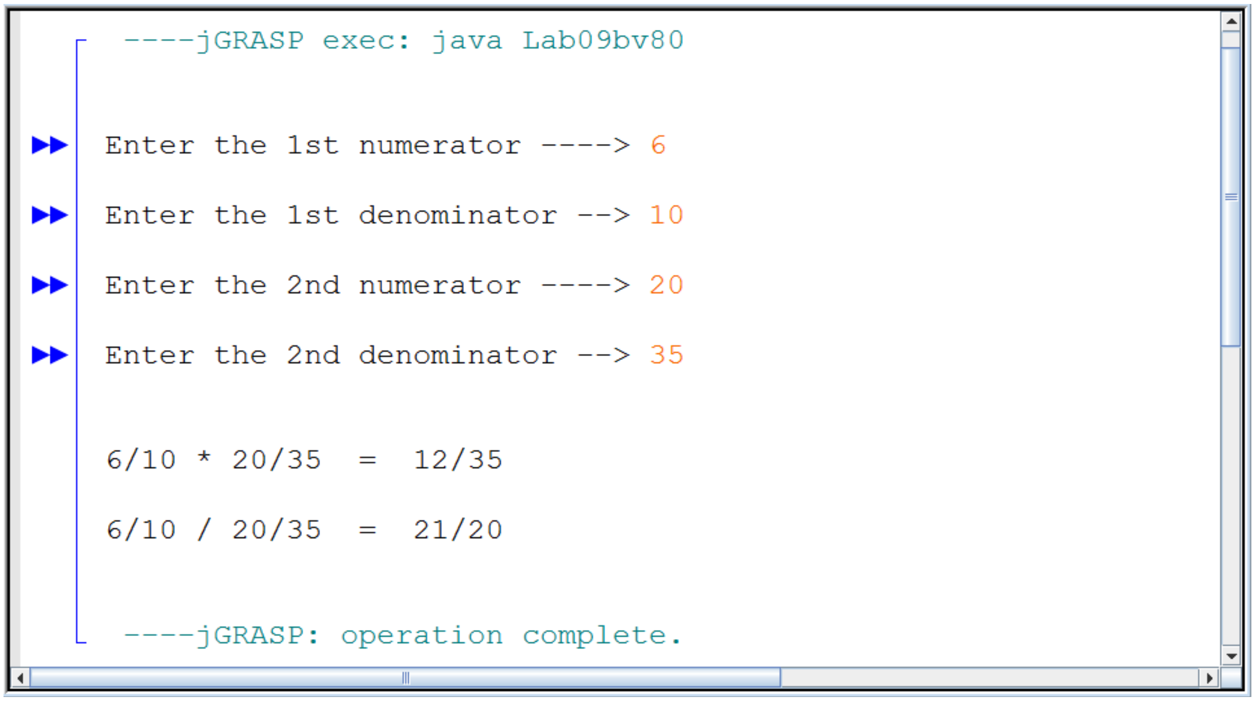
80-Point Version Specifics

For the 80-point version you need to write two constructor **`Rational`** methods and methods **`reduce`**, **`getReduced`**, and **`getOriginal`**. You will also need to write methods **`multiply`** and **`divide`**. Your fractions need to be reduced. Not only do you need to write the **`reduce`** method, but you also need to call it in the appropriate places so that the product and quotient will be displayed in lowest terms.

80-Point Version Outputs



```
 ----jGRASP exec: java Lab09bv80


Enter the 1st numerator ----> 2

Enter the 1st denominator --> 5

Enter the 2nd numerator ----> 5

Enter the 2nd denominator --> 7


2/5 * 5/7  =  2/7

2/5 / 5/7  =  14/25


 ----jGRASP: operation complete.
```

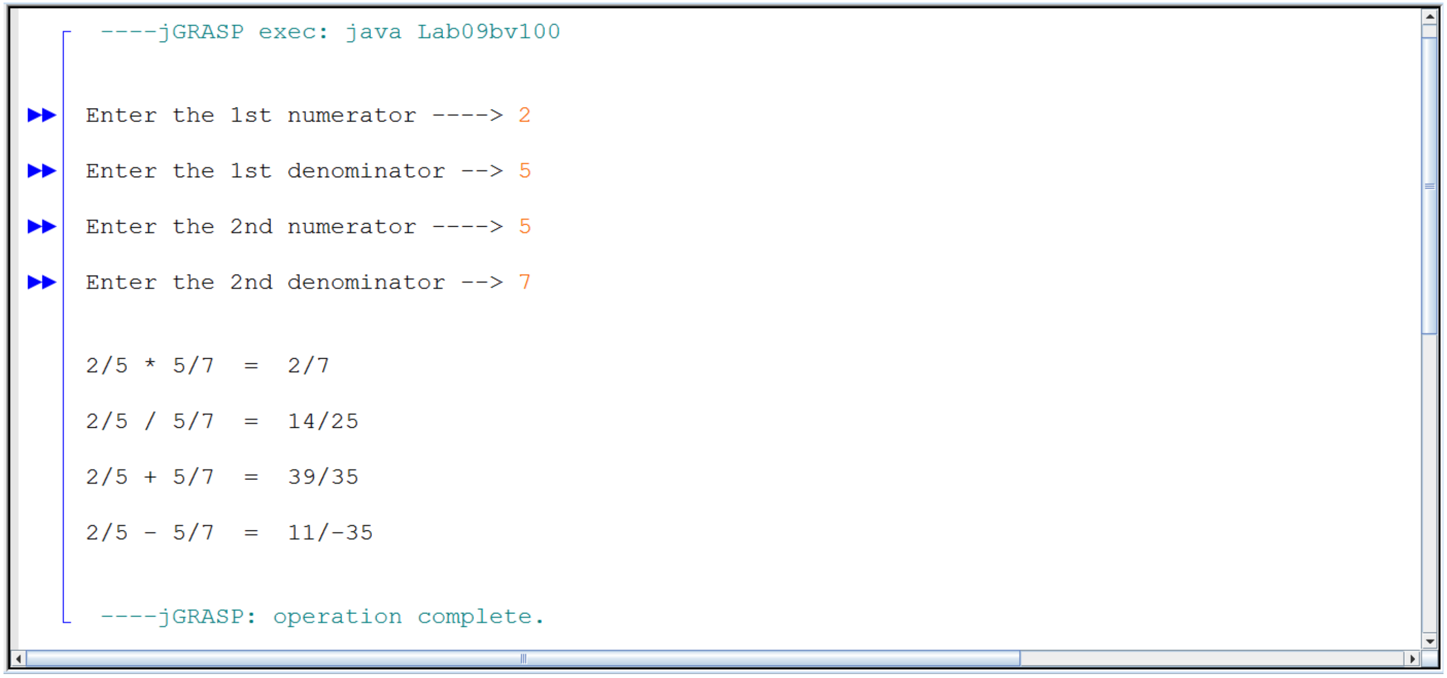


```
 ----jGRASP exec: java Lab09bv80


Enter the 1st numerator ----> 6

Enter the 1st denominator --> 10

Enter the 2nd numerator ----> 20

Enter the 2nd denominator --> 35


6/10 * 20/35  =  12/35

6/10 / 20/35  =  21/20


 ----jGRASP: operation complete.
```

100-Point Version Specifics

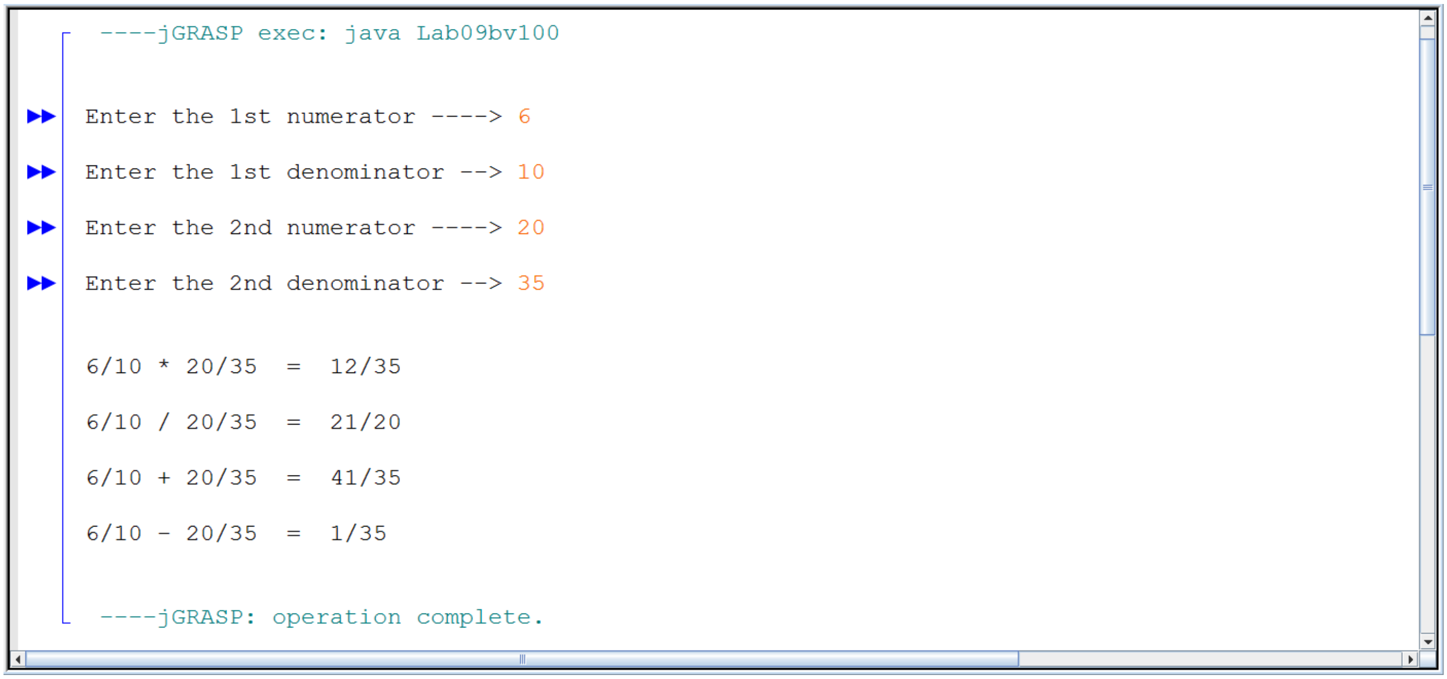
The 100-point version completes the **Rational** class with methods **add** and **subtract**. The sum and difference also need to be displayed in lowest terms.

100-Point Version Outputs



```
 ----jGRASP exec: java Lab09bv100

▶▶ Enter the 1st numerator ----> 2
▶▶ Enter the 1st denominator --> 5
▶▶ Enter the 2nd numerator ----> 5
▶▶ Enter the 2nd denominator --> 7

   2/5 * 5/7  =  2/7
   2/5 / 5/7  =  14/25
   2/5 + 5/7  =  39/35
   2/5 - 5/7  =  11/-35

 ----jGRASP: operation complete.
```

NOTE: In the subtraction answer, the negative sign might show up in the numerator. It also might show up in the denominator. Either way is fine.



```
 ----jGRASP exec: java Lab09bv100

▶▶ Enter the 1st numerator ----> 6
▶▶ Enter the 1st denominator --> 10
▶▶ Enter the 2nd numerator ----> 20
▶▶ Enter the 2nd denominator --> 35

   6/10 * 20/35  =  12/35
   6/10 / 20/35  =  21/20
   6/10 + 20/35  =  41/35
   6/10 - 20/35  =  1/35

 ----jGRASP: operation complete.
```