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Date: 27th April, 2023

Assignment 7

```
public class RationalNumbers {
   private int numerator;
   private int denominator;

   public RationalNumbers(int numerator, int denominator)
   {
   if (denominator == 0) {
       throw new IllegalArgumentException("Denominator cannot be
zero.");
   }
   int gcd = getGCD(numerator, denominator);
   this.numerator = numerator / gcd;
   this.denominator = denominator / gcd;
   }

   public int getNumerator() {
       return numerator;
   }

   public int getDenominator() {
       return denominator;
   }

   public RationalNumbers add(RationalNumber other) {
       int lcm = getLCM(denominator, other.denominator);
       int newNumerator = numerator * (lcm / denominator) +
other.numerator * (lcm / other.denominator);
       return new RationalNumbers(newNumerator, lcm);
   }
```

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```
    public RationalNumbers subtract(RationalNumbers other) {
        int lcm = getLCM(denominator, other.denominator);
        int newNumerator = numerator * (lcm / denominator) -
other.numerator * (lcm / other.denominator);
        return new RationalNumbers(newNumerator, lcm);
    }

    public RationalNumbers multiply(RationalNumbers other) {
        int newNumerator = numerator * other.numerator;
        int newDenominator = denominator * other.denominator;
        return new RationalNumber(newNumerator, newDenominator);
    }

    public RationalNumbers divide(RationalNumbers other) {
        int newNumerator = numerator * other.denominator;
        int newDenominator = denominator * other.numerator;
        return new RationalNumbers(newNumerator, newDenominator);
    }

    public int compareTo(RationalNumbers other) {
        int lcm = getLCM(denominator, other.denominator);
        int thisNumerator = numerator * (lcm / denominator);
        int otherNumerator = other.numerator * (lcm /
other.denominator);
        return Integer.compare(thisNumerator, otherNumerator);
    }

    public double toDouble() {
        return (double) numerator / denominator;
```

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```
    }

    public RationalNumber abs() {
        int newNumerator = Math.abs(numerator);
        int newDenominator = Math.abs(denominator);
        return new RationalNumber(newNumerator, newDenominator);
    }

    private int getGCD(int a, int b) {
        if (b == 0) {
            return a;
        }
        return getGCD(b, a % b);
    }

    private int getLCM(int a, int b) {
        return (a * b) / getGCD(a, b);
    }

   public static void main(String[] args) {
    if (args.length < 4) {
        System.out.println("Please provide four integers as
input.");
        return;
    }

    int num1 = Integer.parseInt(args[0]);
    int denom1 = Integer.parseInt(args[1]);
    int num2 = Integer.parseInt(args[2]);
    int denom2 = Integer.parseInt(args[3]);
```

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```
   RationalNumber rn1 = new RationalNumber(num1, denom1);
   RationalNumber rn2 = new RationalNumber(num2, denom2);

   System.out.println("Rational number 1: " + rn1.getNumerator()
+ "/" + rn1.getDenominator());
   System.out.println("Rational number 2: " + rn2.getNumerator()
+ "/" + rn2.getDenominator());

   // You can call the functions like this:
   RationalNumber sum = rn1.add(rn2);
   RationalNumber difference = rn1.subtract(rn2);
   RationalNumber product = rn1.multiply(rn2);
   RationalNumber quotient = rn1.divide(rn2);
   int comparison = rn1.compareTo(rn2);
   double decimalValue = rn1.toDouble();
   RationalNumber absValue = rn1.abs();

   // Then you can print the results like this:
   System.out.println("Sum: " + sum.getNumerator() + "/" +
sum.getDenominator());
   System.out.println("Difference: " + difference.getNumerator()
+ "/" + difference.getDenominator());
   System.out.println("Product: " + product.getNumerator() + "/"
+ product.getDenominator());
   System.out.println("Quotient: " + quotient.getNumerator() +
"/" + quotient.getDenominator());
   System.out.println("Comparison result: " + comparison);
   System.out.println("Decimal value of rational number 1: " +
decimalValue);
```

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```
    System.out.println("Absolute value of rational number 1: " +
absValue.getNumerator() + "/" + absValue.getDenominator());
    }
}
```

OUTPUT

Trial 1:

```
(base) harshgandhi@HarshGandhisMac ~ % cd ~/Desktop/
(base) harshgandhi@HarshGandhisMac Desktop % javac RationalNumber.java
(base) harshgandhi@HarshGandhisMac Desktop % java RationalNumber 1 2 3 4
Rational number 1: 1/2
Rational number 2: 3/4
Sum: 5/4
Difference: 1/-4
Product: 3/8
Quotient: 2/3
Comparison result: -1
Decimal value of rational number 1: 0.5
Absolute value of rational number 1: 1/2
```

Trial 2:

```
(base) harshgandhi@HarshGandhisMac Desktop % java RationalNumber 1 0 2 3
Exception in thread "main" java.lang.IllegalArgumentException: Denominator cannot be zero.
        at RationalNumber.<init>(RationalNumber.java:19)
        at RationalNumber.main(RationalNumber.java:97)
```

Link to GitHub: https://github.com/HarshGandhi2111/JavaLab_Assignments