

Task 1

Create a calculator to work with rational numbers.

Requirements:

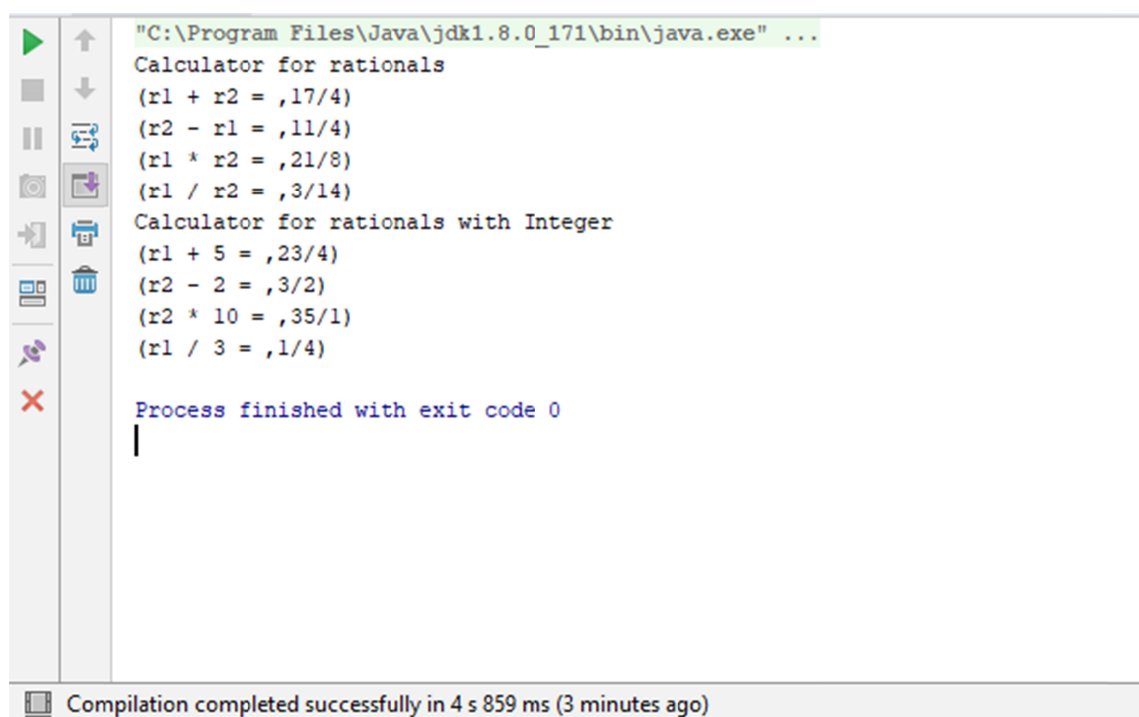
- It should provide capability to add, subtract, divide and multiply rational Numbers
- Create a method to compute GCD (this will come in handy during operations on rational)

Add option to work with whole numbers which are also rational numbers i.e. (n/1)

- achieve the above using auxiliary constructors
- enable method overloading to enable each function to work with numbers and rational.

```
class Rational(n: Int, d: Int) {  
  private def gcd(a: Int, b: Int): Int = {  
    if (a == b) a  
    if (b == 0) a else gcd(b, a % b)  
  }  
  private val g = gcd(n, d)  
  val numer: Int = n / g  
  val denom: Int = d / g  
  def Add(that: Rational) = new Rational(numer * that.denom + that.numer * denom, denom * that.denom)  
  def Add(i: Int): Rational = new Rational(numer + i * denom, denom)  
  
  def Subtract(that: Rational) = new Rational(numer * that.denom - that.numer * denom, denom * that.denom)  
  def Subtract(i: Int): Rational = new Rational(numer - i * denom, denom)  
  
  def Multiply(that: Rational) = new Rational(numer * that.numer, denom * that.denom)  
  def Multiply(i: Int): Rational = new Rational(numer * i, denom)  
  
  def Divide(that: Rational) = new Rational(numer * that.denom, denom * that.numer)  
  def Divide(i: Int): Rational = new Rational(numer, denom * i)  
  
  override def toString: String = numer + "/" + denom  
}
```

```
object Rational {  
  def main(args: Array[String]): Unit = {  
    val r1 = new Rational(3, 4)  
    val r2 = new Rational(7, 2)  
  
    println("Calculator for rationals")  
    println("r1 + r2 = ", r1.Add(r2))  
    println("r2 - r1 = ", r2.Subtract(r1))  
    println("r1 * r2 = ", r1.Multiply(r2))  
    println("r1 / r2 = ", r1.Divide(r2))  
  
    println("Calculator for rationals with Integer")  
    println("r1 + 5 = ", r1.Add(5))  
    println("r2 - 2 = ", r2.Subtract(2))  
    println("r2 * 10 = ", r2.Multiply(10))  
    println("r1 / 3 = ", r1.Divide(3))  
  }  
}
```



The image shows a screenshot of an IDE's console window. On the left is a vertical toolbar with icons for running, stepping through, and other debugging actions. The main area of the console displays the output of a Java program. The output starts with the command prompt path, followed by two sections of calculations: 'Calculator for rationals' and 'Calculator for rationals with Integer'. Each section shows arithmetic operations on rational numbers. The final line indicates that the process finished successfully with exit code 0. At the bottom of the console, a status bar shows the compilation time.

```
"C:\Program Files\Java\jdk1.8.0_171\bin\java.exe" ...  
Calculator for rationals  
(r1 + r2 = ,17/4)  
(r2 - r1 = ,11/4)  
(r1 * r2 = ,21/8)  
(r1 / r2 = ,3/14)  
Calculator for rationals with Integer  
(r1 + 5 = ,23/4)  
(r2 - 2 = ,3/2)  
(r2 * 10 = ,35/1)  
(r1 / 3 = ,1/4)  
  
Process finished with exit code 0  
|  
  
Compilation completed successfully in 4 s 859 ms (3 minutes ago)
```