ASSIGNMENT

Task1 : Create a calculator to work with rational numbers.

Sol:

Number.scala

```
class Number(num: Int, denom: Int) {    // Primary constructor that initializes two arguments
 var numerator = num
 var denominator = denom
def this(num: Int) = this(num, 1)     // An auxiliary constructor that initializes numerator
//with value passed on objection creation and
denominator with fixed value '1'
def this() = this(0, 0) // Another auxiliary constructor that initializes both numerator and denominator
//with value '0'
private def gcd(a: Int, b: Int): Int = { // A recursive function that returns GCD (Greatest Common
Divisor) of two numbers given
 if(b == 0) a
 else gcd(b, a % b)
 }
 def simplifyResult() { // This function is used to reduce fraction
val divisor = gcd(numerator, denominator) // result of any arithmetic operation
 numerator = numerator / divisor
 denominator = denominator / divisor
 }
def addNumbers(r: Number) { // routine for addition of two rational numbers
 numerator = numerator * r.denominator + r.numerator * denominator
 denominator = denominator * r.denominator
 simplifyResult()
 println(numerator + "/" + denominator)
 }
def addNumbers(n: Int) { println(numerator + n) } //overloading addNumbers() method by
// changing datatype of the argument
def subtractNumbers(r: Number) { // routine for subtraction of two rational numbers
 numerator = numerator * r.denominator - r.numerator * denominator
 denominator = denominator * r.denominator
 simplifyResult()
 println(numerator + "/" + denominator)
 }
def subtractNumbers(n: Int) { println(numerator - n) }// overloading subtractNumbers() method
// by changing datatype of the argument
 def multiplyNumbers(r: Number) { // routine for multiplication of two rational numbers
 numerator = r.numerator * numerator
```

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 denominator = r.denominator * denominator
 simplifyResult()
 println(numerator + "/" + denominator)
 }
def multiplyNumbers(n: Int) { println(numerator * n) }//overloading multiplyNumbers() method
 // by changing datatype of the argument
def divideNumbers(r: Number) { // routine for division of two rational numbers
 numerator = numerator * r.denominator
 denominator = r.numerator * denominator
 simplifyResult()
 println(numerator + "/" + denominator)
 }
def divideNumbers(n: Int) { println(numerator / n) } // overloading divideNumbers() method
} // by changing datatype of the argument
```

Main class: Mycalculator.scala

```
object MyCalculator {
def main(args: Array[String]) {
val obj1 = new Number(56, 34) // Input objects with rational numbers for addition
val obj2 = new Number(42, 59)
print("Result of adding " + obj1.numerator + "/" + obj1.denominator + " and "
 + obj2.numerator + "/" + obj2.denominator + ": ")
 obj1.addNumbers(obj2) // addNumbers() method invocation
val obj3 = new Number(3, 4) // Input objects with rational numbers for subtraction
val obj4 = new Number(1, 5)
print("Result of subtracting " + obj4.numerator + "/" + obj4.denominator + " from "
 + obj3.numerator + "/" + obj3.denominator + ": ")
 obj3.subtractNumbers(obj4) // subtractNumbers() method invocation
val obj5 = new Number(1, 2) // Input objects with rational numbers for multiplication
 val obj6 = new Number(2, 5)
print("Result of multiplying " + obj5.numerator + "/" + obj5.denominator + " and "
 + obj6.numerator + "/" + obj6.denominator + ": ")
 obj5.multiplyNumbers(obj6) // multiplyNumbers() method invocation
 val obj7 = new Number(3) // Input objects with rational numbers for division
 val obj8 = new Number(2) // which internally calls an auxiliary constructor
 print("Result of dividing " + obj7.numerator + "/" + obj7.denominator + " by "
 + obj8.numerator + "/" + obj8.denominator + ": ")
 obj7.divideNumbers(obj8) // divideNumbers() method invocation
 println()
 val num1 = 48 // Inputs for whole number arithmetic
 val num2 = 24
```

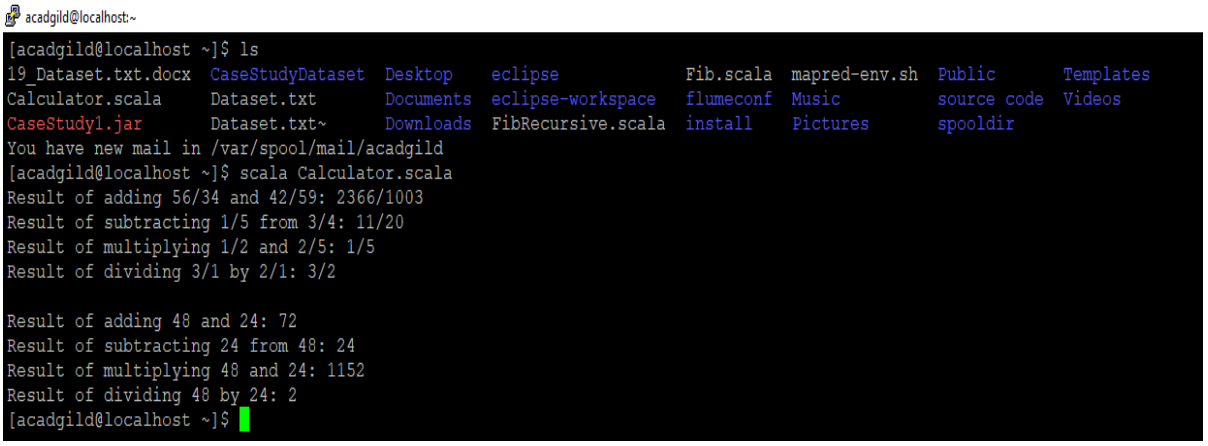
```
 val obj9 = new Number(num1) // Invokes the auxiliary constructor
print("Result of adding "+ num1 +" and "+ num2 +": ")
 obj9.addNumbers(num2) // method call to sum up two integers
print("Result of subtracting "+ num2 +" from "+ num1 +": ")
 obj9.subtractNumbers(num2) // method call for subtraction of integers
 print("Result of multiplying "+ num1 +" and "+ num2 +": ")
 obj9.multiplyNumbers(num2) // method call for multiply two integers
 print("Result of dividing "+ num1 +" by "+ num2 +": ")
 obj9.divideNumbers(num2) // method call for division two integers
 }
}
```

Output:

Result of adding 56/34 and 42/59: 2366/1003
Result of subtracting 1/5 from 3/4: 11/20
Result of multiplying 1/2 and 2/5: 1/5
Result of dividing 3/1 by 2/1: 3/2
Result of adding 48 and 24: 72
Result of subtracting 24 from 48: 24
Result of multiplying 48 and 24: 1152
Result of dividing 48 by 24: 2

Computation:

56/34 + 42/59 = (56/34 * 59/59) + (42/59 * 34/34)
= 4732/2006
= 2366/1003 - reduced result with the help of gcd() function (divisor: 2)
3/4 – 1/5 = (3/4 * 5/5) – (1/5 * 4/4)
 = 15 – 4/2
 = 11/20
1/2 * 2/5 = (1*2) / (2*5)
 = 2/10
 = 1/5 - reduced result with the help of gcd() function (divisor: 2)
3/1 / 2/1 = 3/1 / 1/2
 = 3*1 / 2*1
 = 3/2


acadgild@localhost:~
[acadgild@localhost ~]$ ls
19_Dataset.txt.docx CaseStudyDataset Desktop eclipse Fib.scala mapred-env.sh Public Templates
Calculator.scala Dataset.txt Documents eclipse-workspace flumeconf Music source code Videos
CaseStudy1.jar Dataset.txt~ Downloads FibRecursive.scala install Pictures spooldir
You have new mail in /var/spool/mail/acadgild
[acadgild@localhost ~]$ scala Calculator.scala
Result of adding 56/34 and 42/59: 2366/1003
Result of subtracting 1/5 from 3/4: 11/20
Result of multiplying 1/2 and 2/5: 1/5
Result of dividing 3/1 by 2/1: 3/2
Result of adding 48 and 24: 72
Result of subtracting 24 from 48: 24
Result of multiplying 48 and 24: 1152
Result of dividing 48 by 24: 2
[acadgild@localhost ~]$