Session 14

Assignment 1 Questions

*Session 14: Assignment 1*

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**1. Introduction**

This assignment will help you to consolidate the concepts learnt in the session.

**2. Problem Statement**

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.

N/A

**3. Output**

**class** calc (n: Int, d: Int) {

**def** gcd(a: Int, b: Int): Int = {

**if** (b == 0) {

a;

} **else** {

gcd(b, a % b);

}

}

**val** g = gcd(n, d);

**val** numerator: Int = n / g;

**val** denominator: Int = d / g;

**override** **def** toString = {

numerator + "/" + denominator;

}

//Auxiliary constructor

**def** **this**(num: Int) {

**this**(num, 1);

}

// Addition of Rational

**def** sum(a: calc, b: calc) {

**var** numerator1: Int = a.numerator \* b.denominator;

**var** numerator2: Int = b.numerator \* a.denominator;

**var** denominator: Int = a.denominator \* b.denominator;

**var** numerator: Int = numerator1 + numerator2;

**var** result: calc = **new** calc(numerator, denominator);

println ("The result of Rational Sum : " + result.toString());

}

// Addition of Integer

**def** sum(a: Int, b: Int) {

**var** num1: calc = **new** calc(a);

**var** num2: calc = **new** calc(b);

**var** result = num1.numerator + num2.numerator;

println ("The result of Integer Sum : " + result);

}

// Subtraction of Rational

**def** subtract(a: calc, b: calc) {

**var** numerator1: Int = a.numerator \* b.denominator;

**var** numerator2: Int = b.numerator \* a.denominator;

**var** denominator: Int = a.denominator \* b.denominator;

**var** numerator: Int = numerator1 - numerator2;

**var** result: calc = **new** calc(numerator, denominator);

println ("The result of Rational Subtraction : " + result.toString());

}

// Subtraction of Integer

**def** subtract(a: Int, b: Int) {

**var** num1: calc = **new** calc(a);

**var** num2: calc = **new** calc(b);

**var** result = num1.numerator - num2.numerator;

println ("The result of Integer Subtraction : " + result);

}

// Multiplication of Rational

**def** multiply(a: calc, b: calc) {

**var** numerator: Int = a.numerator \* b.numerator;

**var** denominator: Int = a.denominator \* b.denominator;

**var** result: calc = **new** calc(numerator, denominator);

println ("The result of Rational Multiplication : " + result.toString());

}

// Multiplication of Integer

**def** multiply(a: Int, b: Int) {

**var** num1: calc = **new** calc(a);

**var** num2: calc = **new** calc(b);

**var** result = num1.numerator \* num2.numerator;

println ("The result of Integer Multiplication : " + result);

}

// Division of Rational

**def** divide(a: calc, b: calc) {

**var** numerator: Int = a.numerator \* b.denominator;

**var** denominator: Int = a.denominator \* b.numerator;

**var** result: calc = **new** calc(numerator, denominator);

println ("The result of Rational Division : " + result.toString());;

}

// Division of Integer

**def** divide(a: Int, b: Int) {

**var** numerator1: calc = **new** calc(a);

**var** numerator2: calc = **new** calc(b);

**var** result: Double = numerator1.numerator / numerator2.numerator;

println ("The result of Integer Divsion : " + result);

}

}

**object** calculatorObj {

**def** choices() = {

println("Enter a choice from the below to perform operation :");

println("1. Rational Add");

println("2. Rational Subtraction");

println("3. Rational Multiply");

println("4. Rational Divide");

println("5. Number Add");

println("6. Number Subtraction");

println("7. Number Multiply");

println("8. Number Divide");

println("9. Exit");

}

**def** getInput(choice: Int) {

**var** fraction: calc = **new** calc(1, 1);

choice **match** {

**case** 1 =>

print("Rational Sum : ");

print("Enter numerator value Rational no. 1 : ");

**val** n1 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 1 : ");

**val** d1 = scala.io.StdIn.readInt();

print("Enter numerator value Rational no. 2 : ");

**val** n2 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 2 : ");

**val** d2 = scala.io.StdIn.readInt();

fraction.sum(**new** calc(n1, d1), **new** calc(n2, d2));

**case** 2 =>

println("Rational Subtraction :");

print("Enter numerator value Rational no. 1 : ");

**val** n1 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 1 : ");

**val** d1 = scala.io.StdIn.readInt();

print("Enter numerator value Rational no. 2 : ");

**val** n2 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 2 : ");

**val** d2 = scala.io.StdIn.readInt();

fraction.subtract(**new** calc(n1, d1), **new** calc(n2, d2));

**case** 3 =>

print("Rational Multiplication : ");

print("Enter numerator value Rational no. 1 : ");

**val** n1 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 1 : ");

**val** d1 = scala.io.StdIn.readInt();

print("Enter numerator value Rational no. 2 : ");

**val** n2 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 2 : ");

**val** d2 = scala.io.StdIn.readInt();

fraction.multiply(**new** calc(n1, d1), **new** calc(n2, d2));

**case** 4 =>

println("Rational Division :");

print("Enter numerator value Rational no. 1 : ");

**val** n1 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 1 : ");

**val** d1 = scala.io.StdIn.readInt();

print("Enter numerator value Rational no. 2 : ");

**val** n2 = scala.io.StdIn.readInt();

print("Enter denomenator value Rational no. 2 : ");

**val** d2 = scala.io.StdIn.readInt();

fraction.divide(**new** calc(n1, d1), **new** calc(n2, d2));

**case** 5 =>

println("Number Sum :");

print("Enter value 1 : ");

**val** v1 = scala.io.StdIn.readInt();

print("Enter value 2 : ");

**val** v2 = scala.io.StdIn.readInt();

fraction.sum(v1, v2);

**case** 6 =>

println("Number Subtraction :");

print("Enter value 1 : ");

**val** v1 = scala.io.StdIn.readInt();

print("Enter value 2 : ");

**val** v2 = scala.io.StdIn.readInt();

fraction.subtract(v1, v2);

**case** 7 =>

println("Number Multiplication :");

print("Enter value 1 : ");

**val** v1 = scala.io.StdIn.readInt();

print("Enter value 2 : ");

**val** v2 = scala.io.StdIn.readInt();

fraction.multiply(v1, v2);

**case** 8 =>

println("Number Division :");

print("Enter value 1 : ");

**val** v1 = scala.io.StdIn.readInt();

print("Enter value 2 : ");

**val** v2 = scala.io.StdIn.readInt();

fraction.divide(v1, v2);

}

}

**def** main(args: Array[*String*]) {

**while**(**true**) {

choices();

**var** input = scala.io.StdIn.readInt();

**if** (input < 9) {

getInput(input);

} **else** {

println("Exited .....");

System.exit(0);

}

}

}

}

