Assignment_7

CODE:

```
package Com.College;

/*
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Problem Statetment:Write a Java application that will be able to add, subtract, multiply, divide,
compare, convert to floating point, and find absolute value for rational
numbers, with exception handling
*/

import java.util.InputMismatchException;
import java.util.Scanner;

class RationalNumber {
    private int numerator;
    private int denominator;
// Constructor for creating a Rational Number object
    public RationalNumber(int numerator, int denominator) {
        if (denominator == 0) {
            throw new IllegalArgumentException("Denominator cannot be zero.");
        }
// Set the numerator and denominator of the object
        this.numerator = numerator;
        this.denominator = denominator;
// Simplify the rational number
        simplify();
    }
// Method to add two Rational Numbers
    public RationalNumber add(RationalNumber other) {
        int resultNumerator = this.numerator * other.denominator + other.numerator * this.denominator;
        int resultDenominator = this.denominator * other.denominator;
        return new RationalNumber(resultNumerator, resultDenominator);
    }
// Method to subtract two Rational Numbers
    public RationalNumber subtract(RationalNumber other) {
        int resultNumerator = this.numerator * other.denominator - other.numerator * this.denominator;
        int resultDenominator = this.denominator * other.denominator;
        return new RationalNumber(resultNumerator, resultDenominator);
    }
// Method to multiply two Rational Numbers
    public RationalNumber multiply(RationalNumber other) {
        int resultNumerator = this.numerator * other.numerator;
        int resultDenominator = this.denominator * other.denominator;
        return new RationalNumber(resultNumerator, resultDenominator);
    }
// Method to divide two Rational Numbers
    public RationalNumber divide(RationalNumber other) {
        if (other.numerator == 0) {
            throw new ArithmeticException("Cannot divide by zero.");
        }
        int resultNumerator = this.numerator * other.denominator;
        int resultDenominator = this.denominator * other.numerator;
        return new RationalNumber(resultNumerator, resultDenominator);
    }
// Method to check if two Rational Numbers are equal
    public boolean equals(RationalNumber other) {
        return this.numerator == other.numerator && this.denominator == other.denominator;
    }
// Method to convert a Rational Number to a double value
    public double toDouble() {
        return (double) this.numerator / this.denominator;
    }
// Method to get the absolute value of a Rational Number
    public RationalNumber abs() {
        int absNumerator = Math.abs(this.numerator);
        int absDenominator = Math.abs(this.denominator);
        return new RationalNumber(absNumerator, absDenominator);
    }
// Method to simplify a Rational Number
    private void simplify() {
        int gcd = gcd(this.numerator, this.denominator);
        this.numerator /= gcd;
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        this.denominator /= gcd;
        if (this.denominator < 0) {
            this.numerator = -this.numerator;
            this.denominator = -this.denominator;
        }
    }
// Method to get the greatest common divisor of two integers
    private int gcd(int a, int b) {
        if (b == 0) {
            return a;
        }
        return gcd(b, a % b);
    }
// Override the toString() method to display a Rational Number as a String
    @Override
    public String toString() {
        return this.numerator + "/" + this.denominator;
    }
}

public class Assignment_7 {
    public static void main(String[] args) {
        try {
            int numerator1 = Integer.parseInt(args[0]);
            int denominator1 = Integer.parseInt(args[1]);
            RationalNumber rational1 = new RationalNumber(numerator1, denominator1);

            int numerator2 = Integer.parseInt(args[2]);
            int denominator2 = Integer.parseInt(args[3]);
            RationalNumber rational2 = new RationalNumber(numerator2, denominator2);

            System.out.println("Rational 1 = " + rational1);
            System.out.println("Rational 2 = " + rational2);


            //  For executing a single function out of many, use the following code:

            //     if(args[4].equalsIgnoreCase("add")) {
            //         RationalNumber result = rational1.add(rational2);
            //         System.out.println("Addition: " + rational1 + " + " + rational2 + " = " + result);
            //     } else if(args[4].equalsIgnoreCase("subtract")){
            //         RationalNumber result = rational1.subtract(rational2);
            //         System.out.println("Subtraction: " + rational1 + " - " + rational2 + " = " + result);
            //     } else if(args[4].equalsIgnoreCase("multiply")){
            //         RationalNumber result = rational1.multiply(rational2);
            //         System.out.println("Multiplication: " + rational1 + " * " + rational2 + " = " + result);
            //     } else if(args[4].equalsIgnoreCase("divide")) {
            //         try {
            //             RationalNumber result = rational1.divide(rational2);
            //             System.out.println("Division: " + rational1 + " / " + rational2 + " = " + result);
            //         } catch (ArithmeticException e) {
            //             System.out.println("Division error: " + e.getMessage());
            //         }
            //     } else if(args[4].equalsIgnoreCase("equals")){
            //         boolean isEqual = rational1.equals(rational2);
            //         System.out.println("Equality check: " + rational1 + " = " + rational2 + " is " + isEqual);
            //     } else if(args[4].equalsIgnoreCase("toDouble")) {
            //         double doubleValue1 = rational1.toDouble();
            //         double doubleValue2 = rational2.toDouble();
            //         System.out.println("Floating point conversion: " + rational1 + " = " + doubleValue1 + ", " + rational2 + " = " + dou
            //     } else if(args[4].equalsIgnoreCase("abs")){
            //         RationalNumber result = rational1.abs();
            //         System.out.println("Absolute value: |" + rational1 + "| = " + result);
            //     } else {
            //         System.out.println("Invalid operation");
            //     }
            // } catch (IllegalArgumentException e) {
            //     System.out.println("Invalid input: " + e.getMessage());
            // }

            //For executing all the functions, use the following code:

            RationalNumber result = rational1.add(rational2);
            System.out.println("Addition: " + rational1 + " + " + rational2 + " = " + result);
            result = rational1.subtract(rational2);
            System.out.println("Subtraction: " + rational1 + " - " + rational2 + " = " + result);
            result = rational1.multiply(rational2);
            System.out.println("Multiplication: " + rational1 + " * " + rational2 + " = " + result);

            try {
                result = rational1.divide(rational2);
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                System.out.println("Division: " + rational1 + " / " + rational2 + " = " + result);
            } catch (ArithmeticException e) {
                System.out.println("Division error: " + e.getMessage());
            }

            boolean isEqual = rational1.equals(rational2);
            System.out.println("Equality check: " + rational1 + " = " + rational2 + " is " + isEqual);

            double doubleValue1 = rational1.toDouble();
            double doubleValue2 = rational2.toDouble();
            System.out.println("Floating point conversion: " + rational1 + " = " + doubleValue1 + ", " + rational2 + " = " + doubleValue2);

            result = rational1.abs();
            System.out.println("Absolute value: |" + rational1 + "| = " + result);
        } catch (NumberFormatException e) {
            System.out.println("Input error: " + e.getMessage() + ". Please enter integers as input.");
        } catch (IllegalArgumentException e) {
            System.out.println("Input error: " + e.getMessage());
        } catch (ArrayIndexOutOfBoundsException e) {
            System.out.println("Usage: java As7 <numerator1> <denominator1> <numerator2> <denominator2>");
        }
    }
}
```

OUTPUT:

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA
Rational 1 = -2/3
Rational 2 = -4/5
Addition: -2/3 + -4/5 = -22/15
Subtraction: -2/3 - -4/5 = 2/15
Multiplication: -2/3 * -4/5 = 8/15
Division: -2/3 / -4/5 = 5/6
Equality check: -2/3 = -4/5 is false
Floating point conversion: -2/3 = -0.6666666666666666, -4/5 = -0.8
Absolute value: |-2/3| = 2/3

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA
Input error: Denominator cannot be zero.

Process finished with exit code 0
```

GITHUB:

java_Assignments/Assignment_7 at main · AniketSingh1m/java_Assignments

Contribute to AniketSingh1m/java_Assignments development by creating an account on GitHub.

https://github.com/AniketSingh1m/java_Assignments/tree/main/Assignment_7

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