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**CECS 277**

**Lab1**

**import** java.util.Scanner;

**public** **class** Rational

{

// Data Members

**private** **int** numerator;

**private** **int** denominator;

// Constructor

**public** Rational(**int** num)

{

**this**(num, 1);

}

**public** Rational()

{

numerator = 0;

denominator = 1;

}

**public** Rational(**int** num, **int** den)

{

numerator = num;

denominator = den;

}

// Accessors

**public** **int** getNumerator()

{

**return** numerator;

}

**public** **int** getDenominator()

{

**return** denominator;

}

// Modifiers

**public** **void** setNumerator(**int** value)

{

numerator = value;

}

**public** **void** setDenominator(**int** value)

{

denominator = value;

}

// Input the numerators and denominators

**public** Rational inputRational()

{

Scanner input = **new** Scanner(System.*in*);

System.*out*.println("Enter numerator: ");

numerator = input.nextInt();

System.*out*.println("Enter denominator: ");

denominator = input.nextInt();

**return** **new** Rational(numerator, denominator);

}

// Return the greatest common divisor

**private** **int** GCD(**int** num, **int** den)

{

**int** r;

**while** (den != 0)

{

r = num % den;

num = den;

num = r;

}

**return** num;

}

// Return a string in the form num / den

**public** String toString()

{

**return** (" " + numerator + " / " + denominator + " ");

}

//Add two rational numbers

**public** Rational Add(Rational f)

{

Rational Answer = **new** Rational(numerator \* f.denominator + f.numerator \* denominator

, f.denominator \* denominator);

**return** Answer;

}

// Substract two rational numbers

**public** **void** Substract(Rational f1, Rational f2)

{

Rational one = **new** Rational(f1.numerator \* f2.denominator - f2.numerator

\* f1.denominator, f1.denominator \* f2.denominator);

System.*out*.println(one);

}

// Multiply two rational numbers

**public** Rational Multiply(Rational f)

{

Rational Answer = **new** Rational(numerator \* f.numerator, f.denominator \* denominator);

**return** Answer;

}

// Divide two rational numbers

**public** **void** Divide(Rational f1, Rational f2)

{

Rational one = **new** Rational(f1.numerator \* f2.denominator, f1.denominator \* f2.numerator);

System.*out*.println(one);

}

// Return real value of f1 devided by f2

**public** **static** **double** RationalValue(Rational f1, Rational f2)

{

**return** ((f1.getNumerator() \* f2.getDenominator()) / (f1.getDenominator() \* f2.getNumerator()));

}

// Tester

**public** **static** **void** main(String[] argv)

{

Rational F1 = **new** Rational();

Rational F2 = **new** Rational();

Rational F3 = **new** Rational();

F1.inputRational();

F2.inputRational();

System.*out*.println("F1: " + F1);

System.*out*.println("F2: " + F2);

System.*out*.println(F1 + " + " + F2 + " =" + F1.Add(F2));

System.*out*.print(F1 + " - " + F2 + " =");

F3.Substract(F1, F2);

F3 = F1.Multiply(F2);

System.*out*.println(F1 + " \* " + F2 + " =" + F3);

System.*out*.print(F1 + " : " + F2 + " =");

F3.Divide(F1, F2);

System.*out*.println(F1.numerator + " / " + F1.denominator

+ " / " + F2.numerator + " / " + F2.denominator + " = " + *RationalValue*(F1, F2));

System.*out*.println("Change F1's new numerator to 2 and F2's denominator to 5.");

F1.numerator = 2;

System.*out*.println("F1's new numerator: " + F1.numerator);

F2.denominator = 5;

System.*out*.println("F2's new denominator: " + F2.denominator);

}

}

Output:

Enter numerator:

3

Enter denominator:

2

Enter numerator:

1

Enter denominator:

3

F1: 3 / 2

F2: 1 / 3

3 / 2 + 1 / 3 = 11 / 6

3 / 2 - 1 / 3 = 7 / 6

3 / 2 \* 1 / 3 = 3 / 6

3 / 2 : 1 / 3 = 9 / 2

3 / 2 / 1 / 3 = 4.0

Change F1's new numerator to 2 and F2's denominator to 5.

F1's new numerator: 2

F2's new denominator: 5