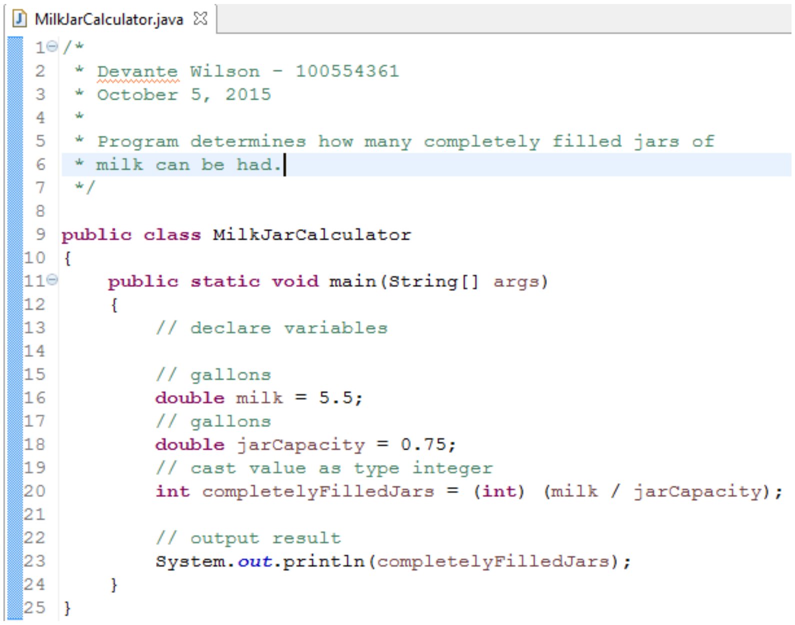
Devante Wilson
100554361

October 5th, 2015

Assignment 2 – Object Oriented Programming and Design

1. The program with the program is that the variable, completelyFilledJars is of type integer, trying to hold a floating point number (double). This can easily be fixed by either:

   Casting milk/jarCapacity as an integer.



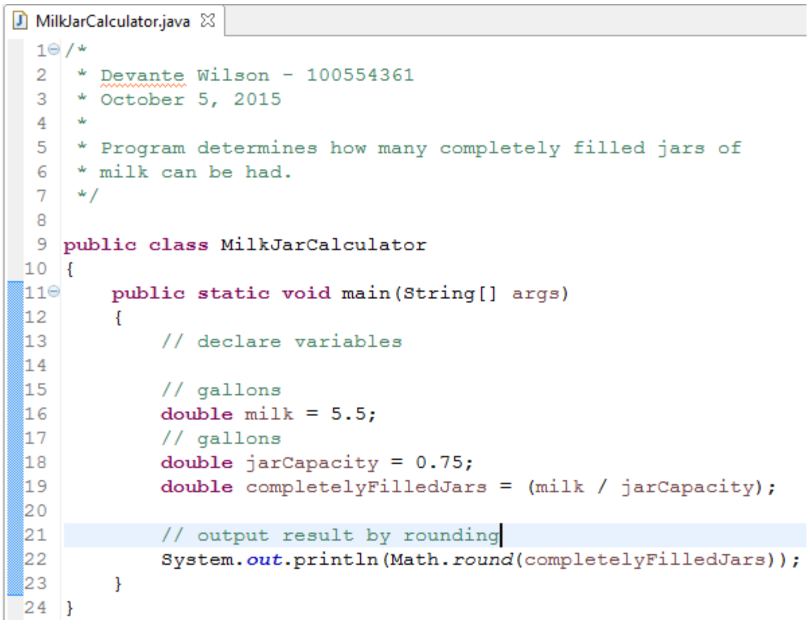
```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program determines how many completely filled jars of
 * milk can be had.
 */

public class MilkJarCalculator
{
    public static void main(String[] args)
    {
        // declare variables

        // gallons
        double milk = 5.5;
        // gallons
        double jarCapacity = 0.75;
        // cast value as type integer
        int completelyFilledJars = (int) (milk / jarCapacity);

        // output result
        System.out.println(completelyFilledJars);
    }
}
```

   Making completelyFilledJars a variable of type double and rounding the result.



```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program determines how many completely filled jars of
 * milk can be had.
 */

public class MilkJarCalculator
{
    public static void main(String[] args)
    {
        // declare variables

        // gallons
        double milk = 5.5;
        // gallons
        double jarCapacity = 0.75;
        double completelyFilledJars = (milk / jarCapacity);

        // output result by rounding
        System.out.println(Math.round(completelyFilledJars));
    }
}
```

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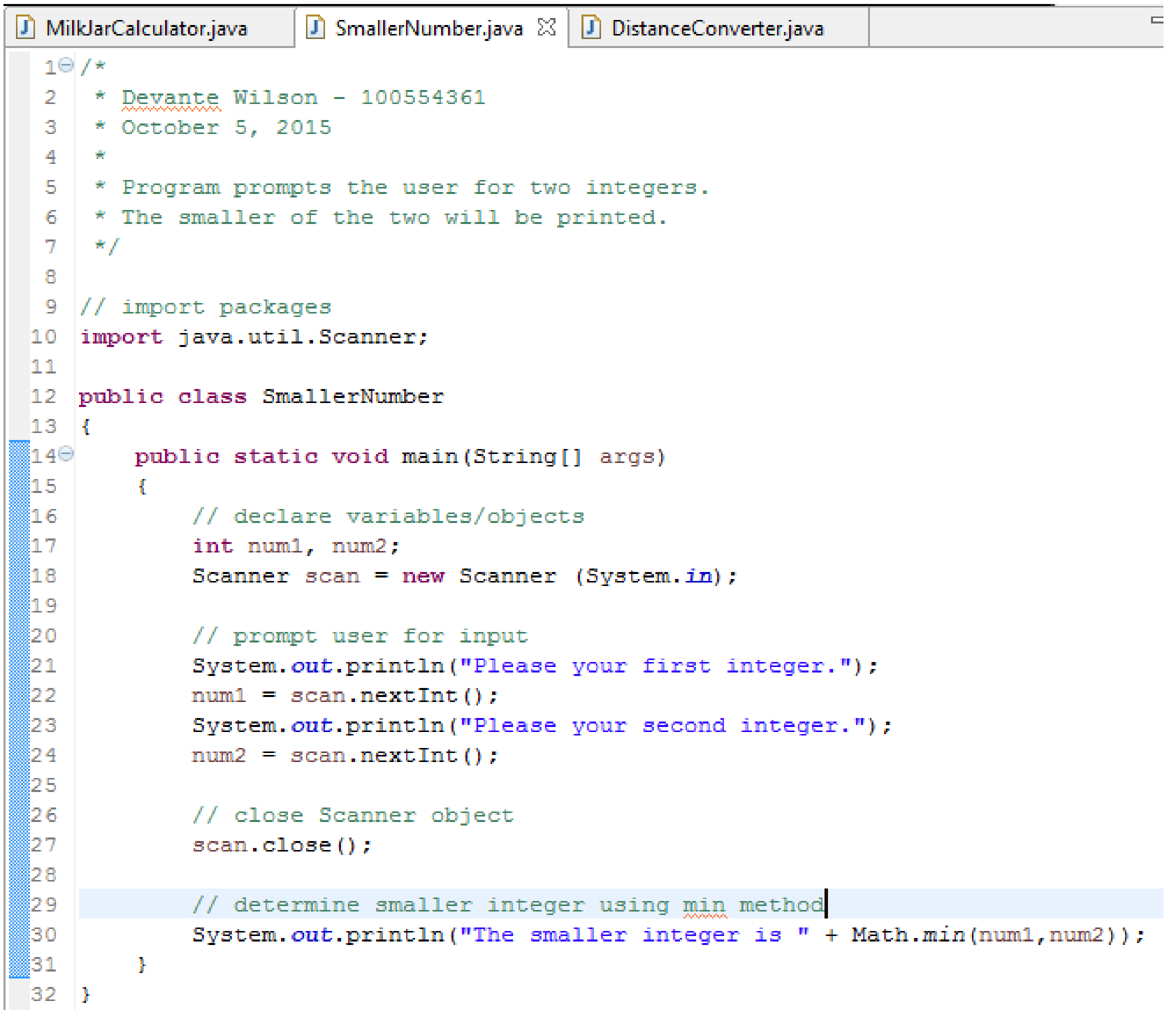
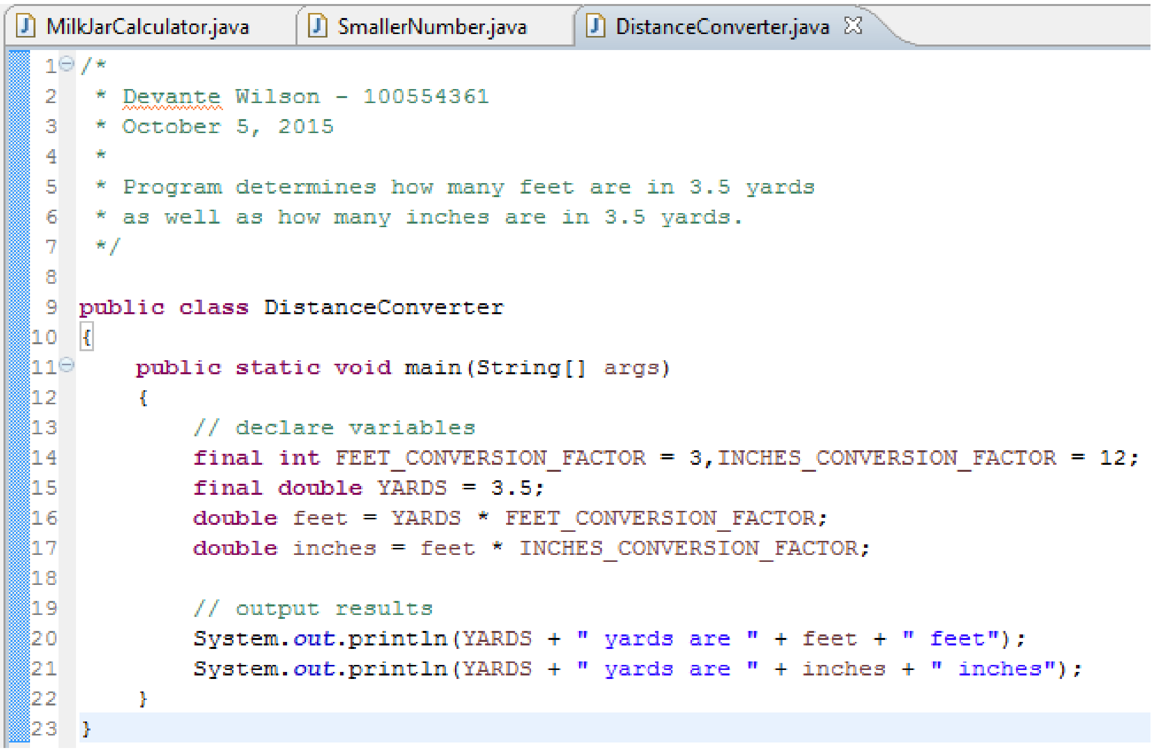
2.



```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program prompts the user for two integers.
 * The smaller of the two will be printed.
 */

// import packages
import java.util.Scanner;

public class SmallerNumber
{
    public static void main(String[] args)
    {
        // declare variables/objects
        int num1, num2;
        Scanner scan = new Scanner (System.in);

        // prompt user for input
        System.out.println("Please your first integer.");
        num1 = scan.nextInt();
        System.out.println("Please your second integer.");
        num2 = scan.nextInt();

        // close Scanner object
        scan.close();

        // determine smaller integer using min method
        System.out.println("The smaller integer is " + Math.min(num1,num2));
    }
}
```

3.



```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program determines how many feet are in 3.5 yards
 * as well as how many inches are in 3.5 yards.
 */

public class DistanceConverter
{
    public static void main(String[] args)
    {
        // declare variables
        final int FEET_CONVERSION_FACTOR = 3,INCHES_CONVERSION_FACTOR = 12;
        final double YARDS = 3.5;
        double feet = YARDS * FEET_CONVERSION_FACTOR;
        double inches = feet * INCHES_CONVERSION_FACTOR;

        // output results
        System.out.println(YARDS + " yards are " + feet + " feet");
        System.out.println(YARDS + " yards are " + inches + " inches");
    }
}
```

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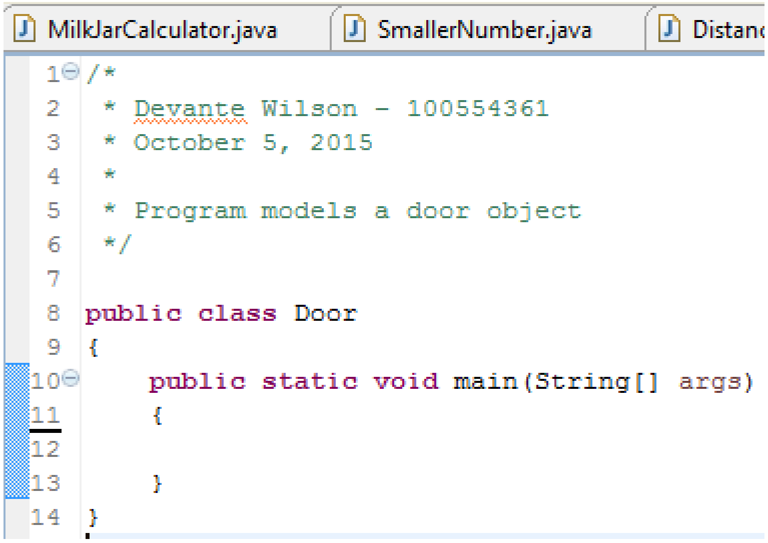
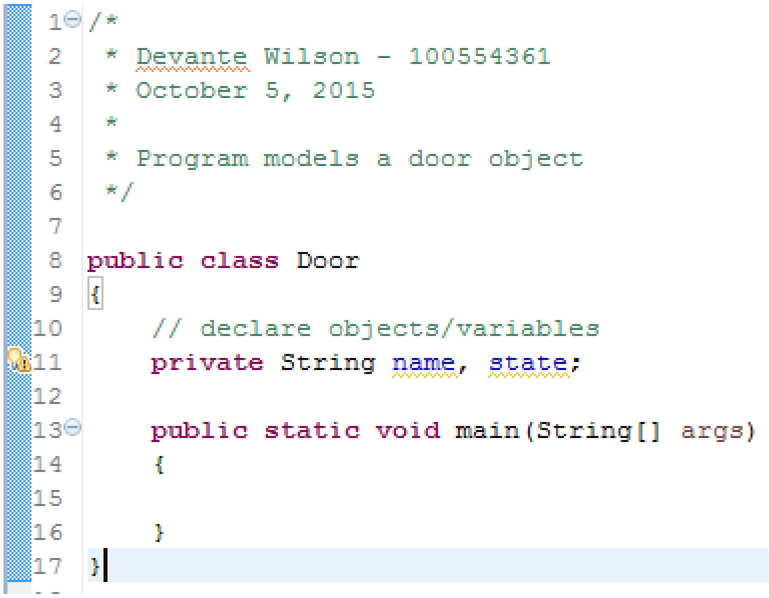
4.1



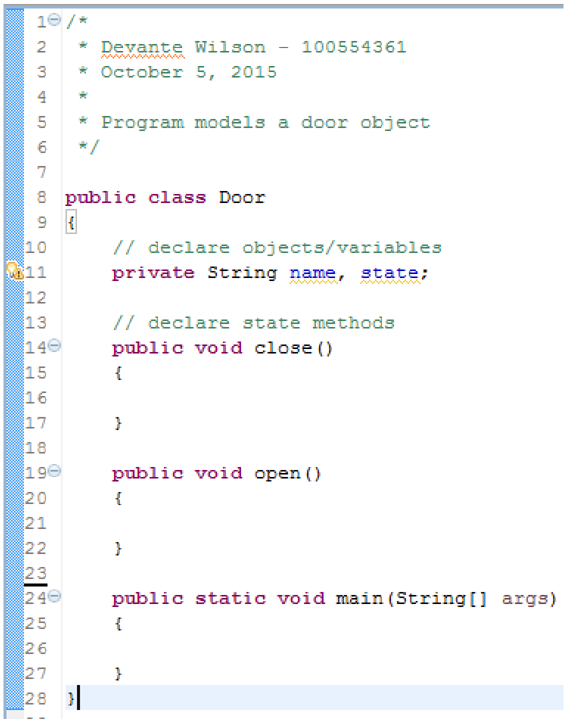
```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program models a door object
 */

public class Door
{
    public static void main(String[] args)
    {

    }
}
```

4.2



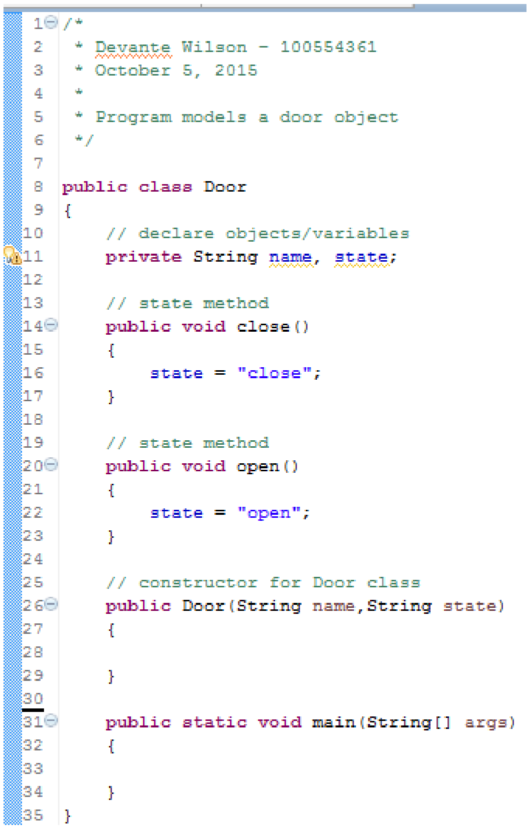
```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program models a door object
 */

public class Door
{
    // declare objects/variables
    private String name, state;

    public static void main(String[] args)
    {

    }
}
```

4.3



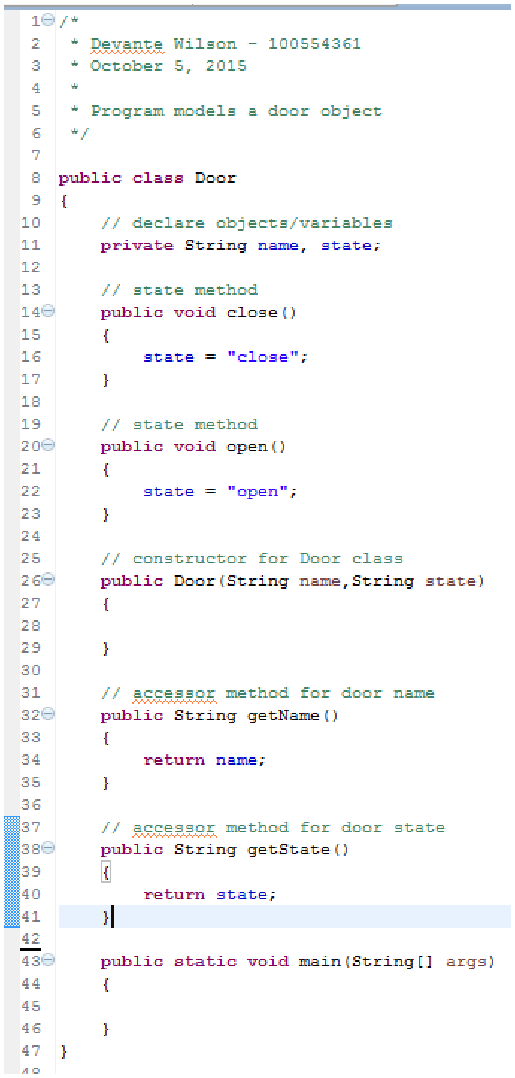
```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program models a door object
 */

public class Door
{
    // declare objects/variables
    private String name, state;

    // declare state methods
    public void close()
    {

    }

    public void open()
    {

    }

    public static void main(String[] args)
    {

    }
}
```

4.4



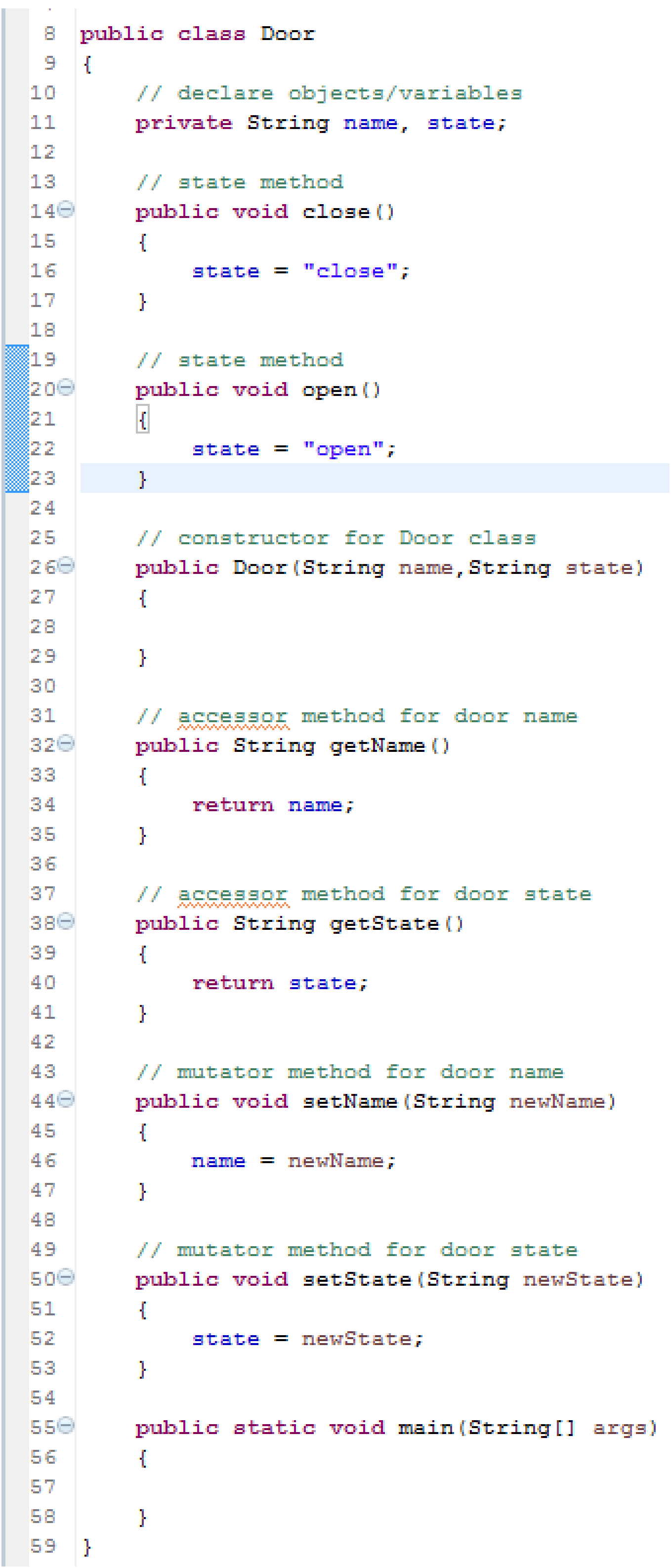
```
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program models a door object
 */

public class Door
{
    // declare objects/variables
    private String name, state;

    // state method
    public void close()
    {
        state = "close";
    }

    // state method
    public void open()
    {
        state = "open";
    }

    // constructor for Door class
    public Door(String name,String state)
    {

    }

    public static void main(String[] args)
    {

    }
}
```

4.5



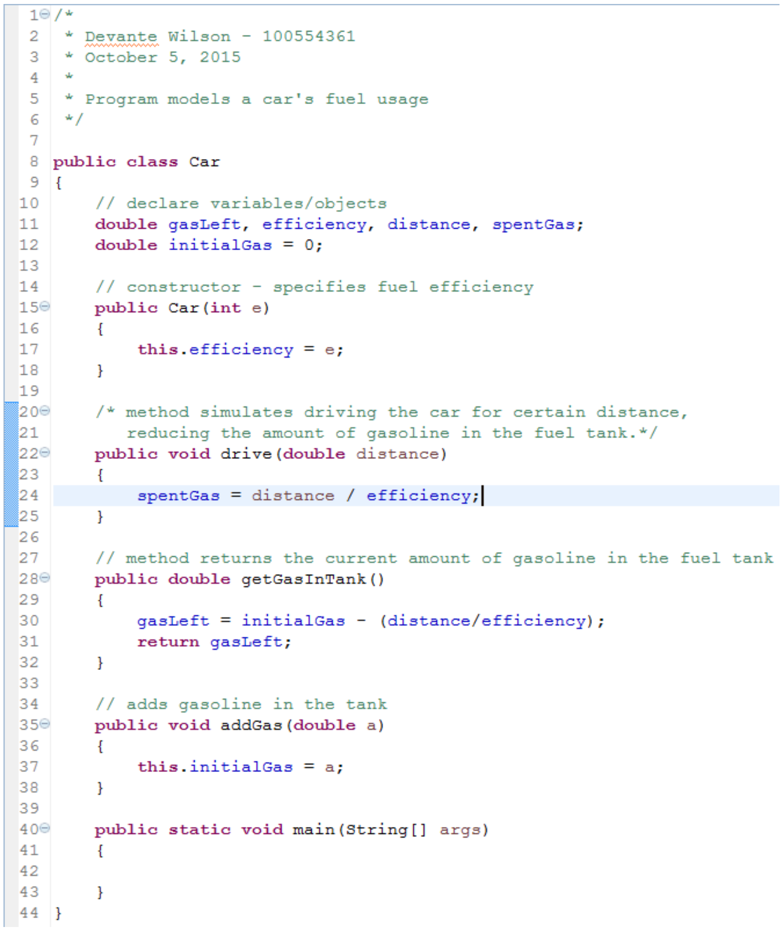
```
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program models a door object
 */

public class Door
{
    // declare objects/variables
    private String name, state;

    // state method
    public void close()
    {
        state = "close";
    }

    // state method
    public void open()
    {
        state = "open";
    }

    // constructor for Door class
    public Door(String name,String state)
    {

    }

    // accessor method for door name
    public String getName()
    {
        return name;
    }

    // accessor method for door state
    public String getState()
    {
        return state;
    }

    public static void main(String[] args)
    {

    }
}
```

4.6

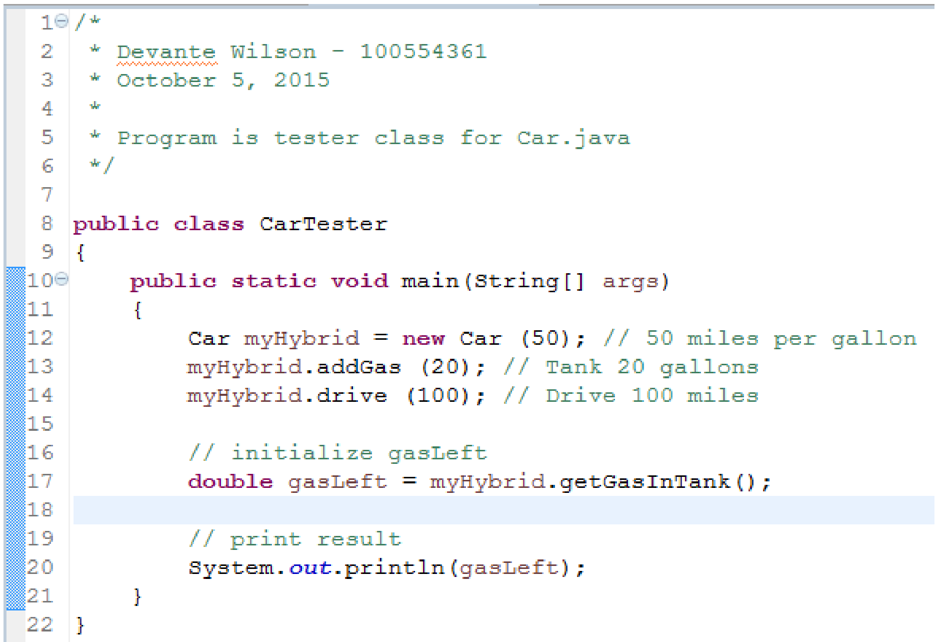


```java
public class Door
{
    // declare objects/variables
    private String name, state;

    // state method
    public void close()
    {
        state = "close";
    }

    // state method
    public void open()
    {
        state = "open";
    }

    // constructor for Door class
    public Door(String name,String state)
    {

    }

    // accessor method for door name
    public String getName()
    {
        return name;
    }

    // accessor method for door state
    public String getState()
    {
        return state;
    }

    // mutator method for door name
    public void setName(String newName)
    {
        name = newName;
    }

    // mutator method for door state
    public void setState(String newState)
    {
        state = newState;
    }

    public static void main(String[] args)
    {

    }
}
```

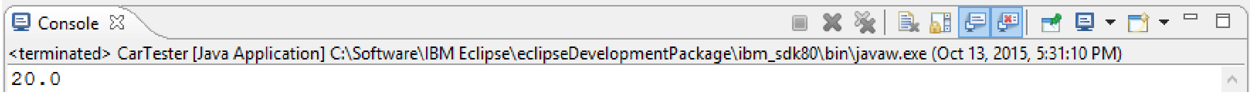
5.



```
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program models a car's fuel usage
 */

public class Car
{
    // declare variables/objects
    double gasLeft, efficiency, distance, spentGas;
    double initialGas = 0;

    // constructor - specifies fuel efficiency
    public Car(int e)
    {
        this.efficiency = e;
    }

    /* method simulates driving the car for certain distance,
       reducing the amount of gasoline in the fuel tank.*/
    public void drive(double distance)
    {
        spentGas = distance / efficiency;
    }

    // method returns the current amount of gasoline in the fuel tank
    public double getGasInTank()
    {
        gasLeft = initialGas - (distance/efficiency);
        return gasLeft;
    }

    // adds gasoline in the tank
    public void addGas(double a)
    {
        this.initialGas = a;
    }

    public static void main(String[] args)
    {

    }
}
```

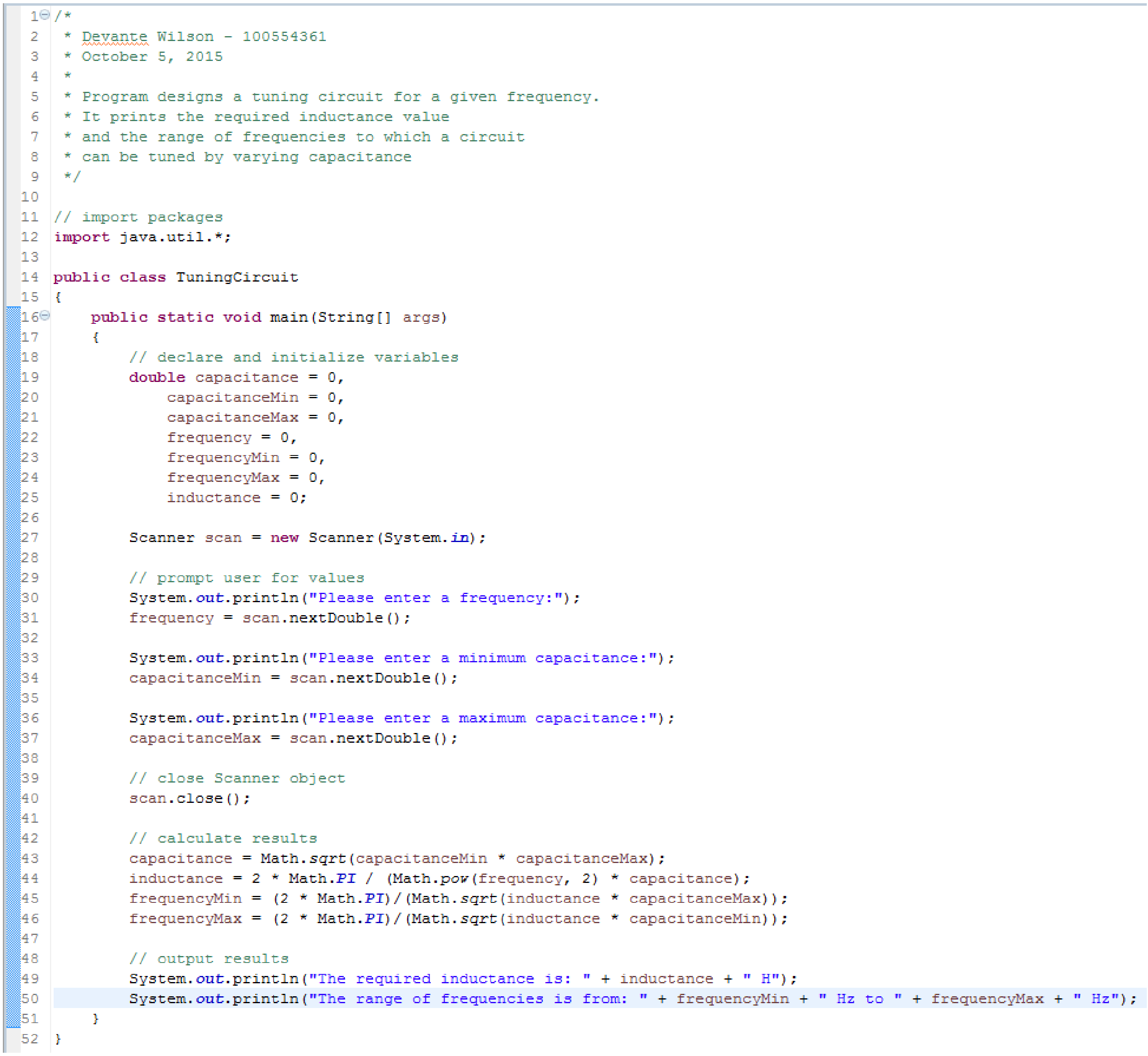


```
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program is tester class for Car.java
 */

public class CarTester
{
    public static void main(String[] args)
    {
        Car myHybrid = new Car (50); // 50 miles per gallon
        myHybrid.addGas (20); // Tank 20 gallons
        myHybrid.drive (100); // Drive 100 miles

        // initialize gasLeft
        double gasLeft = myHybrid.getGasInTank();

        // print result
        System.out.println(gasLeft);
    }
}
```



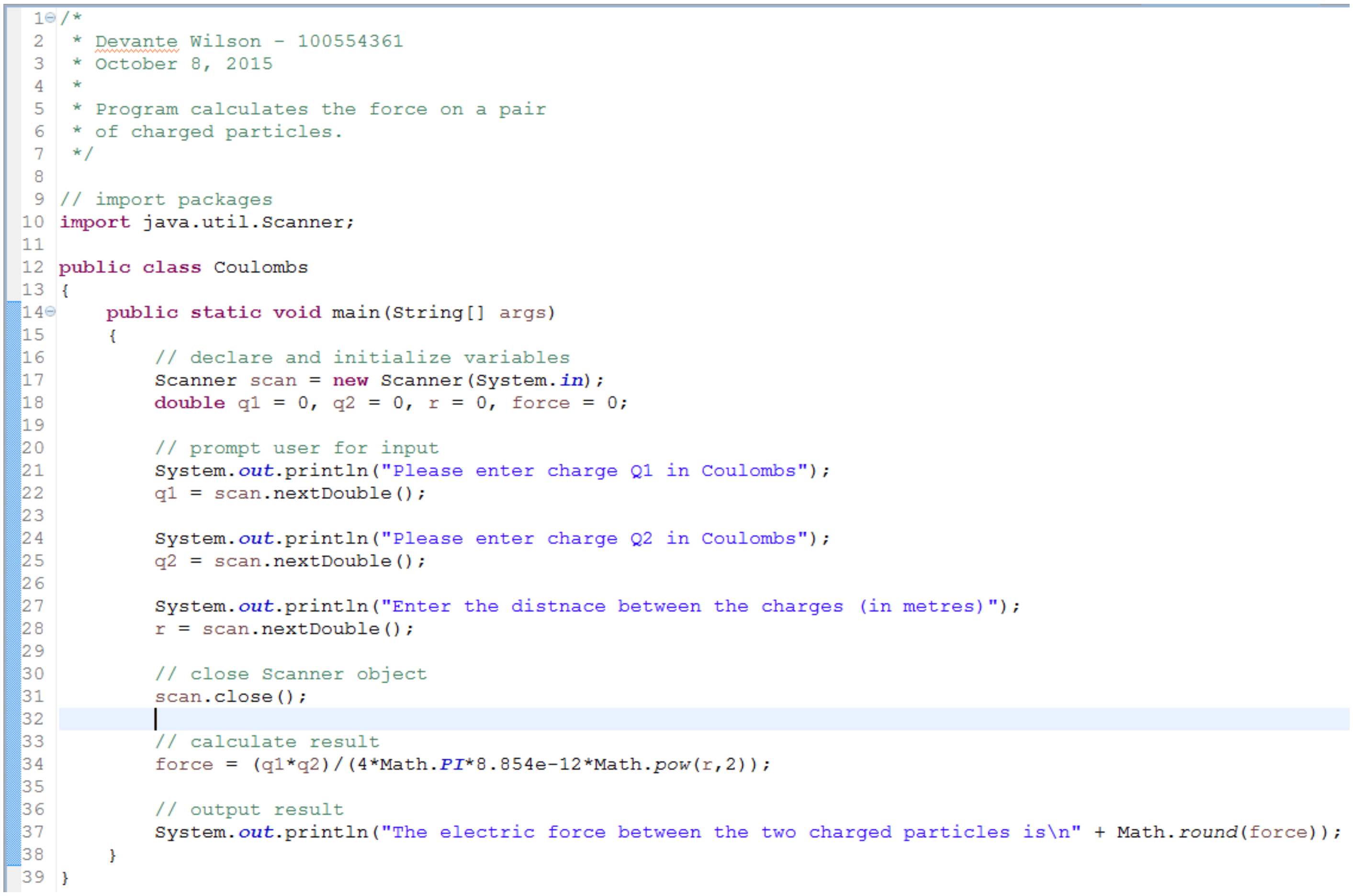
```
<terminated> CarTester [Java Application] C:\Software\IBM Eclipse\eclipseDevelopmentPackage\ibm_sdk80\bin\javaw.exe (Oct 13, 2015, 5:31:10 PM)
20.0
```

6.



```java
/*
 * Devante Wilson - 100554361
 * October 5, 2015
 *
 * Program designs a tuning circuit for a given frequency.
 * It prints the required inductance value
 * and the range of frequencies to which a circuit
 * can be tuned by varying capacitance
 */

// import packages
import java.util.*;

public class TuningCircuit
{
    public static void main(String[] args)
    {
        // declare and initialize variables
        double capacitance = 0,
            capacitanceMin = 0,
            capacitanceMax = 0,
            frequency = 0,
            frequencyMin = 0,
            frequencyMax = 0,
            inductance = 0;

        Scanner scan = new Scanner(System.in);

        // prompt user for values
        System.out.println("Please enter a frequency:");
        frequency = scan.nextDouble();

        System.out.println("Please enter a minimum capacitance:");
        capacitanceMin = scan.nextDouble();

        System.out.println("Please enter a maximum capacitance:");
        capacitanceMax = scan.nextDouble();

        // close Scanner object
        scan.close();

        // calculate results
        capacitance = Math.sqrt(capacitanceMin * capacitanceMax);
        inductance = 2 * Math.PI /  (Math.pow(frequency, 2) * capacitance);
        frequencyMin = (2 * Math.PI)/(Math.sqrt(inductance * capacitanceMax));
        frequencyMax = (2 * Math.PI)/(Math.sqrt(inductance * capacitanceMin));

        // output results
        System.out.println("The required inductance is: " + inductance + " H");
        System.out.println("The range of frequencies is from: " + frequencyMin + " Hz to " + frequencyMax + " Hz");
    }
}
```

7.



```java
/*
 * Devante Wilson - 100554361
 * October 8, 2015
 *
 * Program calculates the force on a pair
 * of charged particles.
 */

// import packages
import java.util.Scanner;

public class Coulombs
{
    public static void main(String[] args)
    {
        // declare and initialize variables
        Scanner scan = new Scanner(System.in);
        double q1 = 0, q2 = 0, r = 0, force = 0;

        // prompt user for input
        System.out.println("Please enter charge Q1 in Coulombs");
        q1 = scan.nextDouble();

        System.out.println("Please enter charge Q2 in Coulombs");
        q2 = scan.nextDouble();

        System.out.println("Enter the distnace between the charges (in metres)");
        r = scan.nextDouble();

        // close Scanner object
        scan.close();

        // calculate result
        force = (q1*q2)/(4*Math.PI*8.854e-12*Math.pow(r,2));

        // output result
        System.out.println("The electric force between the two charged particles is\n" + Math.round(force));
    }
}
```

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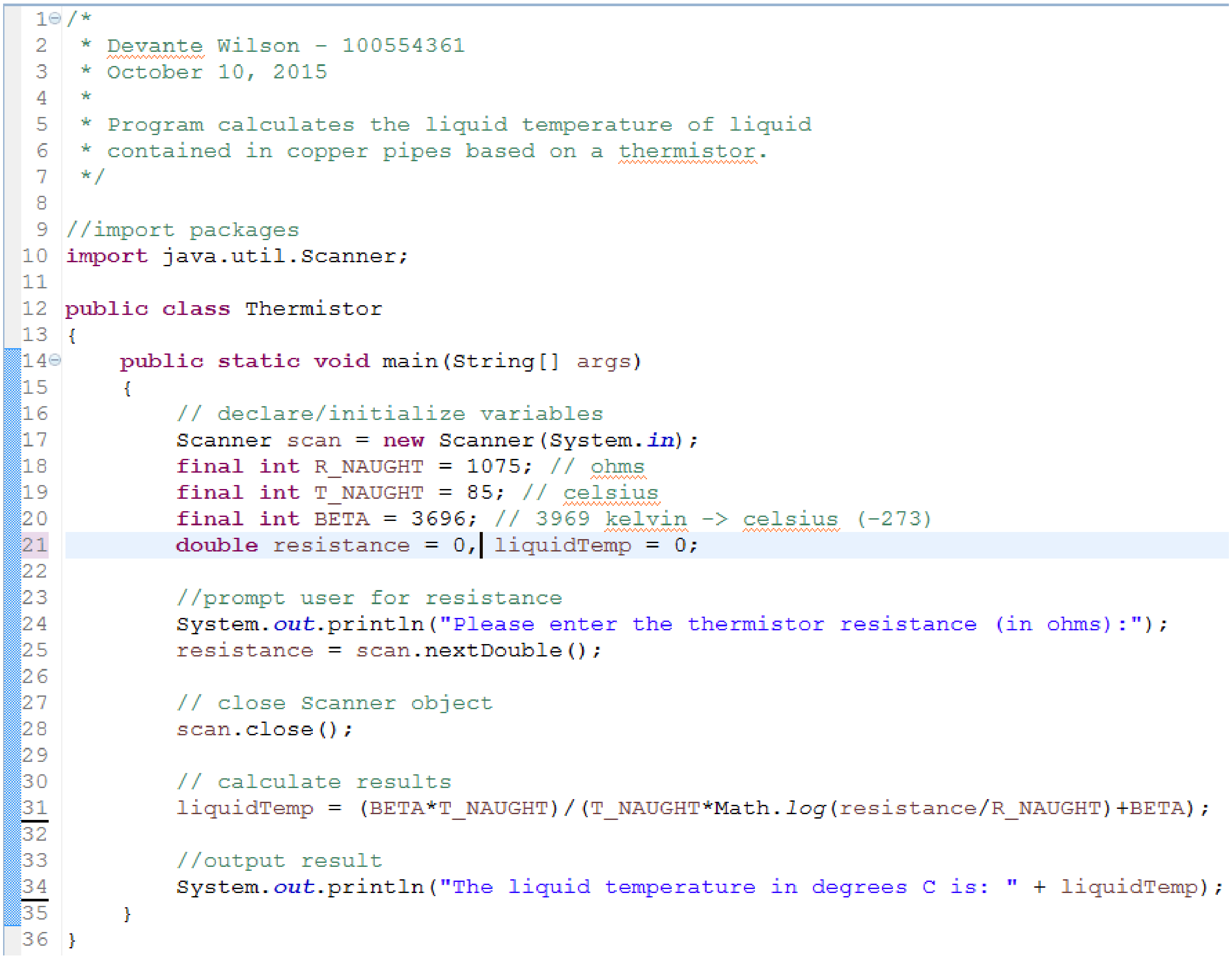
October 5th, 2015

8.



```
/*
 * Devante Wilson - 100554361
 * October 10, 2015
 *
 * Program calculates the liquid temperature of liquid
 * contained in copper pipes based on a thermistor.
 */

//import packages
import java.util.Scanner;

public class Thermistor
{
    public static void main(String[] args)
    {
        // declare/initialize variables
        Scanner scan = new Scanner(System.in);
        final int R_NAUGHT = 1075; // ohms
        final int T_NAUGHT = 85; // celsius
        final int BETA = 3696; // 3969 kelvin -> celsius (-273)
        double resistance = 0, liquidTemp = 0;

        //prompt user for resistance
        System.out.println("Please enter the thermistor resistance (in ohms):");
        resistance = scan.nextDouble();

        // close Scanner object
        scan.close();

        // calculate results
        liquidTemp = (BETA*T_NAUGHT)/(T_NAUGHT*Math.log(resistance/R_NAUGHT)+BETA);

        //output result
        System.out.println("The liquid temperature in degrees C is: " + liquidTemp);
    }
}
```