CSE 2102: Introduction to Software Engineering

Built-in Types, Command Line Arguments

Assigned: Jan 25, 2022, Due: Feb 1, 2022

Problem A (25 pts.)

Write a program `OperationsTwoNumbers.java` that accepts two numbers n1 and n2 as input from the command line and calculates their sum, absolute value of the difference, product, quotient, and exponentiation. Please note the following:

1. The program should be able accept both positive and negative real numbers.
2. For the purposes of division, the first number is the dividend and the second is the divisor.
3. For purposes of exponentiation, the first number is the base and the second is the exponent.

Input cmd:

```
java OperationsTwoNumbers 2.5 -2.0
```

Output:

```
The sum of the two numbers is:   0.5
The difference of the two numbers is:  4.5
The product of the two numbers is:  -5.0
The quotient of the two numbers is:  -1.25
The exponentiation of the two numbers is:  0.16
```

Problem B (25 pts.)

Write a program `TriangleArea.java` that takes three command line inputs `a`, `b`, and `c`, representing the side lengths of a triangle, and prints the area of the triangle using Heron's formula: `area = sqrt(s(s-a)(s-b)(s-c))`, where `s = (a + b + c) / 2`.

Input cmd:

```
java TriangleArea 5 12 13
```

Output:

```
The area of the triangle is: 30.0
```

Problem C (25 pts.)

What is wrong with the following code fragment to convert temperature from Fahrenheit (F) to Celsius:

```
double C = F - 32 * (5 / 9)
```

Explain the problem and correct the code fragment. Name the program `TemperatureConverter.java`, and it takes one `double` command-line argument, which is the temperature in Fahrenheit, and prints the output in Celsius. For example:

Input cmd:

```
java TemperatureConverter 32
```

Output:

```
The temperature in Celsius is: 0.0
```

Problem D (25 pts.)

Write a program `HeatIndex.java` that calculates the Heat Index (HI), by accepting the temperature (T) in degree Celsius and relative humidity (R) as a percentage between 0 and 100. The formula used in the computation is:

$$HI = c1 + c2*T + c3*R + c4*T*R + c5*T^2 + c6*R^2 + c7*T^2R + c8*T*R^2 + c9*T^2*R^2$$

The values of *c1* through *c9* are as follows:

c1 = - 8.78469475556
c2 = 1.61139411
c3 = 2.33854883889
c4 = -0.14611605
c5 = -0.012308094
c6 = -0.0164248277778
c7 = 0.002211732
c8 = 0.00072546
c9 = *-0.000003582*

Can *c1* through *c9* be encoded as "static final" in the code? Why or why not?

Input cmd:

```
java HeatIndex 32 85
```

Output:

```
Heat Index:
Temperature: 32.00 degree celsius
Relative Humidity: 85.00
Heat Index: 46.58 degree celsius
```

Submission

The following deliverables must be submitted on HuskyCT by midnight on February 1, 2022.

a) Well-documented code.
b) At least 2 test cases per problem/part that you used to test the code. The test cases should be submitted in a separate document either as a Word or a txt file.
c) Please make sure that your code compiles, we will test your code offline with specific test cases (common to all).
d) Late submissions (without any legitimate excuse) will incur a penalty of 10% per day.