COMP1006/1406 – Summer 2018

Submit a single file called `assignment2-ID.zip` to cuLearn. Replace `ID` with your CarletonUniversity student number.

Do NOT import or use any classes other than ones provided in the java.lang package or specified in the assignment. You can use String, Object, any primitive Wrapper class (Integer, Double, etc.).

1: Temperature

Complete the provided `Temperature` class. Add any attributes and helper methods as needed. You must complete the constructors and methods in the provided class (without changing any signatures, return types, or modifiers).

In this problem you will need to be able to convert temperatures between Celsius, Fahrenheit and Kelvin. For help, see `https://en.wikipedia.org/wiki/Conversion_of_units_of_temperature`

A temperature object holds a single temperature and displays it in one of the three scales. Once a scale has been set, it will display the temperature in that scale until changed. The default scale is Celsius if not specified.

Examples:

```
Temperature t = new Temperature(10.1);
System.out.println(t.getScale());    // outputs the char 'C'
System.out.println(t);               // outputs 10.1C
t.setScale("F");
System.out.println(t);               // outputs 50.18F
System.out.println(t.getScale());    // outputs the char 'F'
```

When you set a temperature (without explicitly stating the scale), whatever scale is currently used by the object will be used.

Note: Repeatedly changing the scale should not ”change” the value of the temperature. For example,

```
Temperature t = new Temperature(10.1);
System.out.println(t);
for(int i=0; i<10000; i+=1){
   t.setScale("F");
   t.setScale("C");
}
System.out.println(t);
```

Should print out identical strings.

Note: You should have **no** static attributes or methods in your class (unless they were supplied in the starter code).

Note: Your code must use encapsulation. Your grade will be reduced by 5 marks if you do not use encapsulation.

2: Extreme Temperatures

Complete the MaxTemp class. The class consists of a single constructor and a single getter method.

- The constructor takes an array of Temperature objects as input. The input will always be a reference to an array (and never null).
- The getter method returns an array of doubles with exactly two doubles in it. If the object was created with one more more Temperature objects in the constructor's input array then the output consists of the maximum temperature of all Temperature objects passed to the constructor and a count of how many times that maximum was present in the array passed to the constructor (in that order). If zero Temperature objects were passed to the constructor (in the array) then the getter returns [0.0, 0.0].

  Note: The max temperature returned must be displayed in the **Kelvin** scale.

  Note: Different Temperature objects in the array passed to the constructor may have different temperature scales set for themselves.

Since the Temperature objects will store a floating point number for the temperature, you will use the provided EPSILON constant in the MaxTemp class and consider two temperatures as equal if their absolute difference is smaller than EPSILON. Therefore, if Math.abs(temp1 - temp2) < ESILON then temp1 and temp2 are considered equal (close enough to each other to be considered equal).

For example, if the array

```
new Temperature[]{new Temperature(1001.12, "K"),
                  new Temperature(-200.0, "F"),
                  new Temperature(1001.11, "K")}
```

is passed to the constructor, and the tolerance is set to EPSILON = 0.1, then the getMax method will return [1001.12, 2.0].

The return value should still display the actual maximum temperature (in K). In the example above, even though we consider 1001.11 and 1001.12 the ”same” (with the given EPSILON), 1001.12 is still the max to be returned.

Note: Your code must use encapsulation. Your grade will be reduced if you do not use encapsulation.

Submission Recap

A complete assignment will consist of a single file (assignment2.zip) that has a single folder/directory called A2. The A2 folder will have the following five files included: Temperature.java, MaxTemp.java.