University of Windsor

SCHOOL OF COMPUTER SCIENCE
03-60-212 – OOP USING JAVA
SUMMER 2014

ASSIGNMENT– 1

[Submit your complete work within the due date and time as indicated in the CLEW]

Objective:

Write a simple java class, declare and define its attributes and methods, and test your class with a driver class provided.

Problem A:

Write a class named ***Weather*** to represent the local weather. The class should have the following attributes and methods:

Private Attributes:

1. ***double tempC*** *//temperature in °C*
2. ***double windSpeed*** *//wind speed in km/h*
3. ***double windChill*** *//wind chill factor*
4. ***boolean isSevere*** *//indicates if the coldness is severe*

Wind chill factor is a value which shows the cooling effect of the wind in combination with low temperatures. In Canada it is calculated based on the following formula:

$$T_{WC} = 13.12 + 0.6215T_a - 11.37V^{0.16} + 0.3965T_aV^{0.16}$$

Where,

T_{WC} = *Wind chill index, °C*
V = *Wind velocity, km/h*
T_a = *Air temperature, °C*

If Wind Chill is less than **-26 °C**, it is considered as severe, ***(isSevere = true)***. *NOTE: Wind chill temperature is defined* ***only for air temperatures at or below 10 °C*** *and* ***wind speeds at or above 5 km/h.*** *Otherwise, wind chill is the same as air temerature.*

Public Methods:

1. A no-argument **constructor** which initializes ***tempC*** and ***windSpeed***. to some default values (say, **20 °C** and **0 km/h**). The values for ***windChill*** and ***isSevere*** should be calculated based on the above formulae using two ***private*** methods ***setWindChill*** and ***setSeverity***.
2. A two-arguments **constructor** which takes two arbitrary values and assigns them to ***tempC*** and ***windSpeed***. The values for ***windChill*** and ***isSevere*** should be calculated based on the above formulae.
3. ***SetTempC()*** and ***setWindSpeed()*** methods to set the ***valid*** values for the first two attributes, as follows:
    a. Temperature should be between **-45 °C** and **65 °C**
    b. Wind speed should be greater than or equal to **0**

NOTE: Changing the values for ***tempC*** and/or ***windSpeed*** should autometically update the values for ***windChill*** and ***isSevere.***

4. ***getTempC()*** *//returns temperature*
5. ***getWindSpeed()*** *//returns wind speed*
6. ***getWindChill()*** *//returns the value of windchill*
7. ***getSeverity()*** *//returns the severity*
8. ***toString()*** *//returns a string representing the object*
   (See the sample outputs below).

Private Methods:

1. ***setWindchill()*** *//to calculate and set the value of windChill according to current temperature and wind speed, using the given formula and the restrictions. (Use* ***Math.pow(x,y)*** *to evaluate* x^y*)*
2. ***setSeverity()*** *//sets the value of severe according to the value of windChill*
3. ***isValidTemperature()*** *//checks the validity of the temperature*
4. ***isValidWindSpeed()*** *//checks the validity of the wind speed*

Complete and test your class ***Weather*** using the driver class ***TestWeather*** that is provided for you. You can further test your ***Weather*** class by creating other ***Weather*** objects and also changing their attributes by calling the methods ***SetTempC()*** and ***setWindSpeed()***

Question. What would be the result of the following instantiation if we remove the no-argument constructor?

```
Weather w = new Weather();
```

Check that you will have no problem when you do not have the other (two-arguments) constructor as well. Can you guess when the a no argument constructor is provided by the compiler automatically?

Sample Outputs (using the application provided):

Current temperature is 20 °C, feels like 20 °C, with a wind speed of 0 km/h
Current temperature is -10 °C, feels like -17 °C, with a wind speed of 20 km/h
Current temperature is -20 °C, feels like -20 °C, with a wind speed of 0 km/h
Current temperature is -20 °C, feels like -37 °C (severely cold), with a wind speed of 70 km/h