CSE1322 Assignment 3

Background:

In this assignment you'll be writing a class to help you convert between Fahrenheit, Celsius and Kelvin. Then you'll take in a temperature, and figure out the heat index or wind chill for that temperature and output in all three units.

Define a Temperature class:

- Define a Temperature class.
    - Your class must store a temperature in fahrenheit as a private double.
    - Your class must have a constructor which takes no parameters and sets the object attribute temperature to 72f.
    - Your class must have a constructor which takes in two parameters a newTemperature (double) and a unit (char).
        - The object can be created by passing in a temperature in fahrenheit (unit='f") or celsius (unit='c') or kelvin (unit='k').
        - The constructor will have to convert to F before it can store the value, see methods below.
    - Write a method called convertCToF which takes in a temperature in celsius (double) and returns a temperature in Fahrenheit (double)
        - F = 9/5C+32
    - Write a method called convertFtoC which takes in a temperature in fahrenheit (double) and returns a temperature in Celsius (double)
        - C=(F-32)*5/9
    - Write a method called convertKToC which takes in a temperature in Kelvin (double) and returns a temperature in Celsius (double)
        - C=K-273.15
    - Write a method called convertCToK which takes in a temperature in Celsius (double) and returns a temperature in Kelvin (double)
        - K=C+273.15
    - Write a method called getTempInF() which returns the object's temperature in fahrenheit.
    - Write a method called getTempInC() which returns the object's temperature in Celsius.
    - Write a method called getTempInK() which returns the object's temperature in Kelvin.

Driver Program:

In your driver class, you'll add 2 methods:

- Write a method called calculateHeatIndex which takes in a temperature (double) and a humidity (double), and returns the current heat index (double).
- The formula for HeatIndex involves a bunch of constants. Inside this method define the following doubles:
    - `c1=-42.379`
    - `c2=2.04901523`
    - `c3=10.14333127`
    - `c4=-0.22475541`
    - `c5=-0.00683783`
    - `c6=-0.05481717`
    - `c7=0.0012274`
    - `c8=0.00085282`
    - `c9=-0.00000199`
- The formula for Heat Index is:
    - **$HI = c1 + c2*T + c3*R + c4*T*R + c5*T^2 + c6*R^2 + c7*T^2*R + c8*T*R^2 + c9*T^2*R^2$**
    - **T** is the temperature
    - **R** is the Humidity
- Write a method called calculateWindChill which takes in a temperature (double) and a wind speed (double). It will return the windchill (double).
    - The formula for windchill is:
    - 35.74 + 0.6215*T - 35.75 * (W^0.16) + 0.4275 * T * (W^0.16)
- In your main method ask the user to enter the current temperature in fahrenheit. Create a Temperature object with that temp.
- If the temperature is greater than or equal to 80f prompt the user to enter the current humidity (between 0 and 100). If the humidity is greater than or equal to 40, calculate the heatIndex for the temperature and humidity. If it's less than 40%, there is no heat index, so the heat index is just the temperature. Print out the current heat index in Fahrenheit, Celsius and Kelvin.
- If the temperature is 50f or below, ask the user for the current windspeed in mph. If the windspeed is greater than or equal to 3mph, calculate the windchill. Print out the current windchill in Fahrenheit, Celsius, and Kelvin.
- If the temperature is between 50 and 80, print out the entered temperature in Fahrenheit, Celsius and Kelvin.

Sample Output:

(Note because of the use of doubles, the values you get may be slightly different, so long as they round to the same number, you are good.)

What is the current temperature in fahrenheit
80
What is the current humidity percentage (0-100)
80
The current Heat Index is: 83.54439495503902f and 28.635776340481836c and 301.7857702369662k

Sample Output2:

What is the current temperature in fahrenheit
32
What is the current wind speed in mph
10
The current Wind Chill is: 23.72714425963738f and -4.596031186023956c and 268.55396271046044k

Sample Output 3:

What is the current temperature in fahrenheit
65
There is currently no HeatIndex nor WindChill. The temperature you entered is 65.0f and 18.33333420753479c and 291.48332810401917k

Submitting your answer:

Please follow the posted submission guidelines here:
https://ccse.kennesaw.edu/fye/submissionguidelines.php

Ensure you submit before the deadline listed on the lab schedule for CSE1322L here:
https://ccse.kennesaw.edu/fye/courseschedules.php

Rubric:

- Temperature Class (50 points total)
  - temperatureInF should be a private double (4 points)
  - Default constructor sets temp to 72 (5 points)
  - Overloaded constructor takes in temp and unit (10 points total)
    - If unit is f, set temp directly (2 points)
    - If unit is c, convert to f then set (2 points)

        - If unit is k, convert to c then to f and set (4 points)
    - Method convertCToF takes in a double and returns a double (5 points total)
        - Correctly does conversion based on formula given (2 points)
    - Method convertFToC takes in a double and returns a double (5 points total)
        - Correctly does conversion based on formula given (2 points)
    - Method convertKToC takes in a double and returns a double (5 points total)
        - Correctly does conversion based on formula given (2 points)
    - Method convertCToK takes in a double and returns a double (5 points total)
        - Correctly does conversion based on formula given (2 points)
    - Method getTempInF() takes in no parameters and return a double (3 points)
    - Method getTempInC() takes in no parameters calls the conversion method and returns a double (4 points)
    - Method getTempInK() takes in no parameters calls the conversion methods and returns a double (4 points)

Driver Class (50 points total)

- calculateHeatIndex() method (20 points total)
    - Takes in a temperature (double) and humidity (double) (4 points)
    - Returns a double (2 points)
    - Defines the nine variables/constants c1-c9 each as a double and initializes to correct value as instructed (9 points - 1 each)
    - Calculates the final heat index value using the formula provided correctly (5 points)
- calculateWindChill() method (10 points total)
    - Takes in temperature (double) and wind speed (double) (2 points)
    - Correctly calculates the wind chill per the formula provided (7 points)
    - Correctly returns the answer (double) (1 points)
- main() method (20 points total)
    - Prompts the user to enter the temperature and reads in answer (2 points)
    - If temp is warm enough for heat index correctly prompts for humidity, reads answer and calls calculateHeatIndex() (7 points)
    - If temp is cold enough for wind chill, correctly prompts for wind speed, reads answer and calls calculateWindChil() (7 points)
    - Correctly outputs the resulting temp in F, C and K (4 points)
    - Note: Formatting of resulting numbers is not required and has no points associated with it.