CS 1150 Principles of Computer Science
Assignment #2

Purpose: Learn to obtain input from the user, declare constants and variables of different types, manipulate those variables with math operations and display results.
Effort: Individual
Points: 3
Deliverables: Upload a **.zip** file with **ONLY** your source code (.java file) to Canvas by due date. Use file naming convention **StudentID–StudentLastname.zip**. Include your design notes with your submission.

Assignment Description

For this assignment you will create a "wind chill calculator" that determines the wind chill for two different locations. The program will also compute the difference between several values for these **two locations**. Use the following formulas in your program:

Wind Chill   wind chill = $35.74 + 0.6215t - 35.75v^{0.16} + 0.4275tv^{0.16}$ where:
- t is the temperature measured in degrees Fahrenheit
- v is the wind speed measured in miles per hour

Fahrenheit to Celsius   Celsius = (Fahrenheit - 32) X $\frac{5}{9}$

Specifications

1. Add this assignment to the **CS1150 project** you created for assignment #1.

2. Create a new <u>Java class</u> within your **CS1150 project** called **LastNameFirstNameAssignment2**
    a. Right click on your **CS1150** project and select **File->New->Class**

3. The following modules on Canvas contain several helpful documents:
    a. **Programming Assignments Policy** for help with assignment requirements.
        i. Follow the "CS1150 Programming Assignments Policy" on all assignments.
        ii. Document, format, follow naming conventions, comment code, etc.
    b. **Design Notebook** for help with design notebook.
        i. The document **Design Notebook Example** is an example design notebook for this assignment.

4. Write a program that shows the wind chill for each location by doing the following:
    a. Create a **constant** for *the exponent* in the formula which is always 0.16
        i. You can include other constants if you like.

    b. Prompt (i.e. ask) the user for these specific details for **<u>EACH LOCATION</u>**:
        i.   Name of the location (DO NOT include spaces in the name – more on this later)
        ii. Wind speed in mph
        iii. Temperature in Fahrenheit

    c. Display a nicely formatted table that shows the following details for **<u>EACH LOCATION</u>**:

      i.   Location name
     ii.   Wind speed
    iii.   Temperature in Fahrenheit
    iv.   Wind Chill in Fahrenheit
     v.   Temperature in Celsius
    vi.   Wind Chill in Celsius

b. Calculate and display the following **differences** for the 2 locations:
      i.   Wind speed
     ii.   Temperature in Fahrenheit
    iii.   Wind Chill in Fahrenheit
    iv.   Temperature in Celsius
     v.   Wind Chill in Celsius

Must Do and Tips

Must Do: Use meaningful names for your variables
- Variables names like *f* for Fahrenheit, *c* for Celsius, *ws* for wind speed, etc. are not allowed.
- Use *meaning names* for your variables so instead of *f* use a name like ***fahrenheit***, etc.

Must Do: Use constants and variables of correct types
- Use a **double constant** for the exponent value in the formula:
  - `final double EXPONENT_CONSTANT = 0.16;`
- Use **double variables** for values obtained from user.
- Use **String** data type to store the location's name (i.e. PikesPeak)
  - The **String** data type is a sequence of characters.
  - Use the **next()** method provided by the Scanner class when reading the location's name, do not use **nextLine().** See example below.
  - See section 4.4 (p.130) for more information about Strings

```
// Create a scanner object to perform input
Scanner input = new Scanner(System.in);
System.out.print("Enter name of 1st location: ");
String nameLoc1 = input.next();
```

This reads a String from the console

This declares a variable "nameLoc1" that is a String

Tip: Formatting output to the console (getting those numbers to line up) – see section 4.6
- Section 4.6 presents a lot of options to format your output.
- For this assignment, you can do one of two things to line the numbers up nicely:

    Option #1 (easy): Use spaces in your **System.out.println** statements

    Option #2 (more adventurous) : Use **System.out.printf** with **format specifiers**.
- Here are some formatting possibilities:
  - **\t** places one tab in output,
  - **\t\t** places two tabs in the output,
  - **\n** places a new line in the output

- To format numbers with ***decimal points*** use:

- **System.out.printf** with a *format specifier*
- Note the method is **printf** not **println**

- **%6.2f** is a *format specifier*. It displays a <u>decimal value</u> with the following format:
  - Total field width is at least 6 spaces including the decimal point
  - 2 digits will follow the decimal point

- Example
  - `System.`*`out`*`.printf(`**`"%6.2f"`**`, windSpeedLoc1);`

  - Note that:
    - The format specifier is in double quotes.
    - A **comma** is used not a **+ sign** as is used in System.out.println
    - This will display the value in *windSpeedLoc1* and use 6 spaces for all the digits with two digits after the decimal point.

- If you want to play with the other specifiers, you are welcome to experiment, but doing so is **NOT** a requirement for this assignment.

- To help you get started, here are 3 lines of code to display the location name, wind speed, temp

```
System.out.printf("%s", nameLoc1);
System.out.printf("\t%6.2f", windSpeedLoc1);
System.out.printf("\t\t%6.2f", fahrenheitLoc1);
```

Tip: Absolute value and power methods
- Java contains many useful predefined methods for performing common mathematical functions.
- You will need to use the **absolute value** method when computing the differences and the **power** method when computing the wind chill.
- Example:
  - Math.abs (-2) returns a value of 2
  - Math.pow(10,2) returns a value of 10^2 = 100

Output
I entered the following values to produce the output shown below.
You can use these values to ensure your code is producing the correct results.

==Note that there is no space include in name==

- Location #1
  - Name   PikesPeak
  - Wind speed   21
  - Temp in fahrenheit   7
- Location #2
  - Name   MountEverest
  - Wind speed   5
  - Temp in fahrenheit   -26

Your output should look like the following:

```
Location #1 Information:
--------------------------
Enter name of 1st location: PikesPeak
Enter the wind speed at 1st location: 21
Enter the temp in Fahrenheit at 1st location: 7

Location #2 Information:
---------------------------
Enter name of 1st location: MountEverest
Enter the wind speed at 1st location: 5
Enter the temp in Fahrenheit at 1st location: -26

*******************************************************************************
                            Wind Chill Calculator
*******************************************************************************

Location    Wind Speed   Temperature(F)   Wind Chill(F)   Temperature(C)   Wind Chill(C)
----------------------------------------------------------------------------------------
PikesPeak     21.00          7.00            -13.23          -13.89           -25.13
MountEverest   5.00        -26.00            -41.05          -32.22           -40.58
----------------------------------------------------------------------------------------
Differences   16.00         33.00            27.82            18.33            15.46
```

Note this value is **off by one**.
Subtracting -40.58 from -25.13 should be 15.**45**
But, if you print the value to 3 decimal places, you'll see it's 15.457.
15.457 is rounded up to 15.46 when 2 decimals are shown.