

Lab Assignment 2

CS1021 002 Spring 2014 – Prof. Annexstein

Due

Lab Assignment 1 must be submitted by Wednesday January 22 via [CascadeLMS](#). Try to complete this lab assignment and submit it via [CascadeLMS](#) during the lab session on Wednesday, Jan. 15. If you do not complete Lab Assignment 2 and submit it during the lab session, you must submit it via [CascadeLM](#) by the day of the next lab.

Objective

The objective of this assignment is to practice coding programs that do (a) interactive input and output, (b) significant arithmetic computation, (c) multiple selection operations and (d) use the math library. After this assignment you will understand how to write simple programs that compute useful things. Good programmers often write small programs to do a short, useful computation.

Problem

The term "wind chill" was first coined by the Antarctic explorer Paul Siple in 1939 in his dissertation, "Adaptation of the Explorer to the Climate of Antarctica." In the fall of 2001, the U.S. National Weather Service replaced the old formula for computing the wind chill temperature with a new one that involved raising the wind speed using a magic number exponent. Here is a link to the formulae: <http://www.crh.noaa.gov/ddc/?n=windchill>

Here is how you calculate the **Old Wind Chill Index**:

Old Wind Chill $T(wc) = 0.081 \times (3.71 \times \sqrt{V} + 5.81 - 0.25 \times V) \times (T - 91.4) + 91.4$

Here is how you calculate the **New Wind Chill Index**:

New Wind Chill $T(wc) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

where $T(wc)$ is the Wind Chill in degrees Fahrenheit, V is the Wind Speed in MPH, and T is the temperature in degrees Fahrenheit.

Part I

Write a program that computes and displays the wind chill from user-supplied floating point values (you can use the type `double`). Your computation may involve functions from the math library [<cmath>](#), such as the `pow` function (i.e., `pow(x, y)` returns x to the power y). Your computation should use the new formula. Then compute again using the old formula for comparison.

To design your program, first prompt the user for the current temperature T in Fahrenheit and the wind speed in miles per hour (MPH). You will then compute the wind chill temperatures using both formulas, and display them rounded to the nearest integer. Hint: You can use the `round` function for this. Please do not use type casting.

Use the website referenced above to test whether your formulae are correct.

Part II

Using the formula to convert Fahrenheit temperatures to Centigrade and place these values in your formatted output.

$$(T - 32) * 5/9$$

You should convert the input temperature as well as the output wind chill from both formulas to Centigrade.

Sample Program Run

```
$ g++ chill.cpp
$ ./a.out
Please enter a temperature in degrees Fahrenheit: 10
Please enter the wind speed in MPH: 10
Temp: 10 degrees Fahrenheit:
  new wind chill formula: -4
  old wind chill formula: -9
Temp: -12 Centigrade:
  new wind chill formula: -20
  old wind chill formula: -23
```