ENGR 102
Wind Chill Temperature Calculation in C++

Introduction

This program calculates the wind chill temperature based on the wind speed and temperature. Wind chill temperature is a measure of how cold people feel due to the combination of wind and cold temperatures.

Problem Statement

Given the wind speed (v) in miles per hour (mi/h) and the temperature (T) in degrees Fahrenheit (°F), the task is to compute the wind chill temperature (Twc) using the wind chill formula.

$$T_{wc} = 35.74 + 0.6215T - 35.75v^{0.16} + 0.4275Tv^{0.16}$$

Solution Steps

- Define the variables for wind speed (v) and temperature (T).

- Compute the wind chill temperature (Twc) using the provided wind chill formula.

- Output the calculated wind chill temperature.

Pseudo Code

1. Begin main function.

    1.1 Define the wind speed (v) in miles per hour and the temperature (T) in degrees Fahrenheit.

    1.2 Calculate the wind chill temperature (Twc) using the provided formula:

      Twc = 35.74 + 0.6215 * T - 35.75 * v^0.16 + 0.4275 * T * v^0.16

      1.2.1 Compute the wind chill temperature using the formula:

        - Add 35.74 to the product of 0.6215 and T.

        - Subtract the product of 35.75 and the wind speed raised to the power of 0.16.

        - Add the product of 0.4275, T, and the wind speed raised to the power of 0.16.

    1.3 Output the value of Twc with the text "Wind Chill Temperature: ".

    1.4 End main function.

C++ Code

```cpp
#include <iostream>

#include <cmath>

using namespace std;

int main() {

    double v = 42; // wind speed in mi/h

    double T = 30; // temperature in degree F

    // Wind Chill Temperature

    double Twc = 35.74 + 0.6215 * T - 35.75 * pow(v, 0.16) + 0.4275 * T * pow(v, 0.16);

    cout << "Wind Chill Temperature: " << Twc << endl;

    return 0;

}
```

Code Explanation

- ❑ **#include <iostream>#include <cmath>using namespace std;**

These lines include necessary header files.

- ❑ **int main() {**

This line marks the beginning of the 'main' function, which is the entry point of the program.

- ❑ **double v = 42; // wind speed in mi/h   double T = 30; // temperature in degree F**

These lines define and initialize variables representing the wind speed ('v') in miles per hour and the temperature ('T') in degree
Fahrenheit..

- ❑ **double Twc = 35.74 + 0.6215 * T - 35.75 * pow(v, 0.16) + 0.4275 * T * pow(v, 0.16);**

This line calculates the wind chill temperature (Twc) using the formula provided.

- ❑ **cout << "Wind Chill Temperature: " << Twc << endl;**

This line outputs the value of Twc to the standard output stream, preceded by the text "Wind Chill Temperature: ".

- ❑ **return 0;}**

This line indicates the end of the 'main' function and returns an integer value of '0' to the operating system, typically indicatin
successful execution.

Final Answer

- The calculated Wind Chill Temperature (T_{wc}) is the final answer.

Wind Chill Temperature= 12.6953

Output

/tmp/W0JfQsw2YH.o

Wind Chill Temperature: 12.6953

Additional Comments/Tips

- Ensure the input values for wind speed and temperature are accurate and within reasonable ranges.

- Validate the correctness of the formula and the computed result.

Conclusion

This program provides a practical tool for estimating the wind chill temperature, which is valuable for assessing the potential risk of cold-related health issues in outdoor environments.