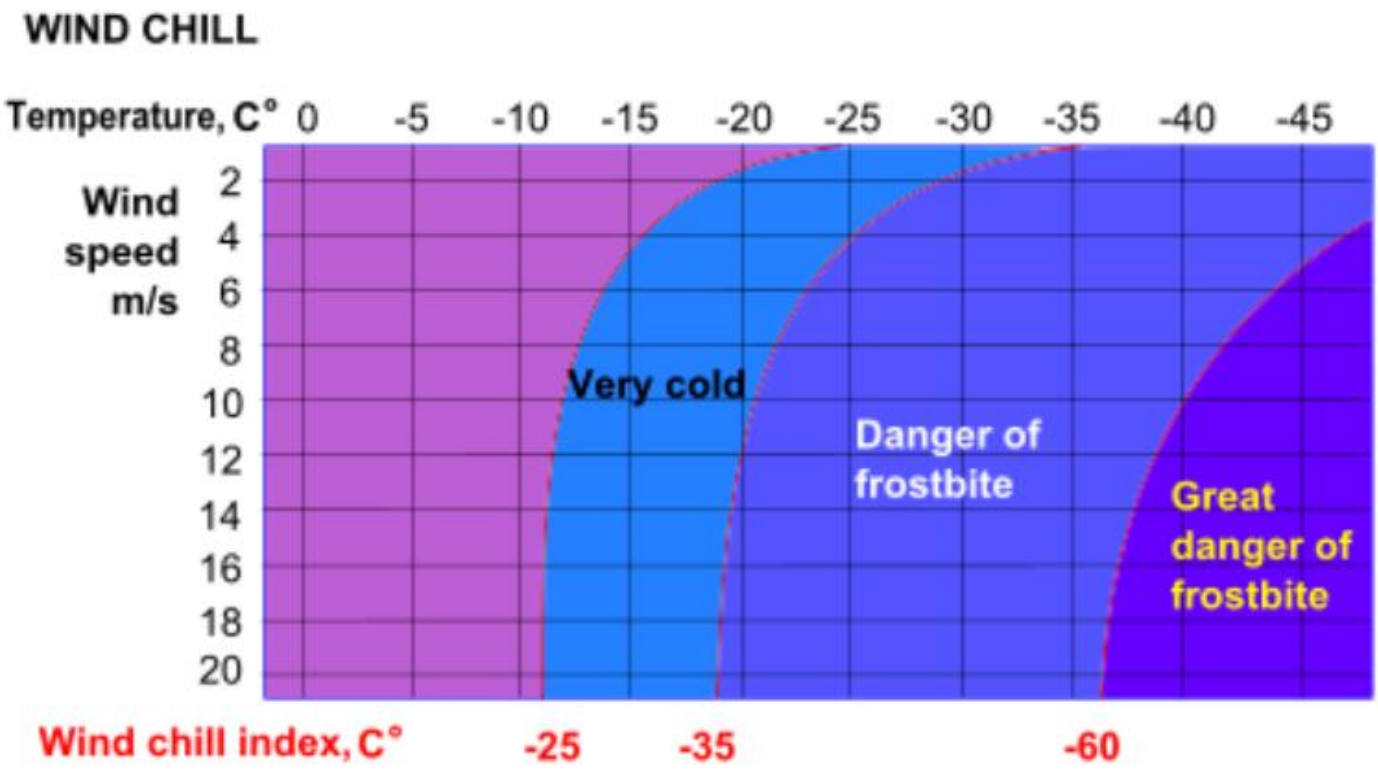
C WindChill Assignment – Fall 2021 – CSC240

Features:

- input / output
- declarations
- variables (use meaningfulNames)
- constants (use MEANINGFUL_NAMES)
- assignment statements
- decisions
- loops
- data validation
- loop control variable
- functions

Wind moving over bare skin during cold weather increases the heat loss from the body. We call it *wind chill* or the *wind chill factor*. Wind chill is a complex function of several factors, the most important being air temperature and wind speed. With low temperatures and strong winds, sometimes the body cannot keep up with the heat loss and the temperature of the skin decreases. This can lead to the freezing of exposed skin surfaces. Normally though, the wind plus the cold temperatures just leads to discomfort.

Usually charts are given to help people figure the wind chill for different wind speeds. Here is a short one (borrowed from Ed Phillip's ARIZONA ALMANAC):



However, there is a formula that was used to create that table. Here it is:

The standard wind chill formula for Environment Canada is:

$$T_{\mathrm{wc}} = 13.12 + 0.6215T_{\mathrm{a}} - 11.37v^{+0.16} + 0.3965T_{\mathrm{a}}v^{+0.16}$$

where T_{wc} is the wind chill index, based on the Celsius temperature scale; T_{a} is the air temperature in degrees Celsius; and v is the wind speed at 10 m (33 ft) standard anemometer height, in kilometres per hour.[9]

where WC is the wind chill factor, T is the temperature in degrees Fahrenheit, V is the wind speed in miles per hour.

Write a short C program to:

1. Prompt the user to input their name
2. Ask them for the air temperature, including unit
3. Asks them for wind speed.
4. Displays their name, the wind chill factor and a message stating if it is cold (> 32 f), freezing (10 f > 32 f) or heck frozen over (< 10 f). Make up your own PG13 messages.
5. Ask the user if they want to continue. If so, go back to step 2. If not, end the program.

See the pseudocode and flowchart at the end of this document for more information on the flow of the program.

Constraints:

1. Must be written in C. Not C++.
2. Keeps asking for Temperature, Unit and Wind Speed until valid. Must be able to handle invalid input.
3. Temperature must be between -10 f and 45 f (but can be entered as Fahrenheit tor Celsius).
4. Unit must be either f, F, c or C.
5. Wind Speed must be between 0 and 25
6. Will display the WincChill in the appropriate unit. i.e. if they enter f or F, results in in Fahrenheit. If they enter c or C, the results is in Celsius.
7. Will display an additional statement for the weather. Something like, "Sure is cold today" or "Nice day for a walk" or "At least it's a dry heat". You choose the phrases and the boundaries. Make the program unique to you.
8. Will repeat the above steps as long as the user wants to continue.
9. Will have **functions** for each of the **bold** statements in the pseudo code below.

Pseudo code (Flow Chart on next page).

Main Method

```
Print welcome Message
Do
      Get Temperature and Unit
      Get Wind Speed
      Calculate Wind Chill
      Display Wind Chill and message about weather
While (User wants to continue)
Print End Message
```

End Main Method

Hand in:

- A well-documented WindChill.c on replit

Rubric: 20 points

• Handles Data Validation Correctly including invalid entries	5 points
• Follows the flowchart as designed.	2 points
• Uses Functions as required	5 points
• Documentation and Indentation:	2 points
• Handles Fahrenheit and Celsius	5 points
• Other	1 points

Code Flowchart