

Computer Project #1

Assignment Overview

This assignment focuses on the design, implementation and testing of a Python program to display the wind chill temperature index under certain conditions (see below).

It is worth 10 points (1% of course grade) and must be completed no later than 11:59 PM on Monday, January 13.

Assignment Specifications

Your program will be logically subdivided into two parts.

For each of the following air temperature and wind speed measurements, your program will perform the appropriate calculations and display the corresponding wind chill temperature index:

- 10.0 degrees and 15 MPH
- 0.0 degrees and 25 MPH
- -10.0 degrees and 35 MPH

After calculating and displaying the wind chill temperature indices for the three pairs of measurements given above, your program will then:

- prompt the user to enter an air temperature measurement and accept a floating point value representing that measurement
- prompt the user to enter a wind speed measurement and accept a floating point value representing that measurement
- perform the appropriate calculations
- display the wind chill temperature index for those user-selected values

Note that all air temperature measurements are given in the Fahrenheit scale.

Assignment Deliverable

The deliverable for this assignment is the following file:

proj01.py – the source code for your Python program

Be sure to use the specified file name (“proj01.py”) and to submit it for grading via the **handin** system before the project deadline.

Assignment Notes

When air moves across exposed skin, humans perceive the temperature to be colder than the measured air temperature. The National Weather Service uses a formula to quantify that perception:

The NWS Wind Chill Temperature (WCT) index uses advances in science, technology, and computer modeling to provide an accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures.

Additional information, including the formula for calculating the WCT index, is available at:

<http://www.nws.noaa.gov/os/windchill/index.shtml>

Commentary

- To clarify the project specifications, sample output is at the end of this document.
- The following Python statement can be used to calculate the Wind Chill Temperature Index, assuming that variables “air_temp” and “air_speed” have been assigned values:

```
wct_index = 35.74 + 0.6215 * air_temp \
            - 35.75 * air_speed**0.16 \
            + 0.4275 * air_temp * air_speed**0.16
```

- The `print` function is used to display some combination of variables, values and strings. Each item to be displayed must be separated from the other items by a comma. By default, the items will be printed together on a single line. For example:

```
val_float = 123.456
print( "Number ", val_float, " times two: ", val_float*2 )
```

This command has four items to display: a string ("Number "), the value in the variable `val_float` (123.456), another string (" times two: ") and the result of evaluating an expression (246.912). It will print:

```
Number 123.456 times two: 246.912
```

- To raise a number to a power, use the `**` operator. For example:

```
print( "10 raised to the power 1.5 is", 10**1.5 )
```

which results in:

```
10 raised to the power 1.5 is 31.622776601683793
```

- The `input` function is used to accept a response from the user. The function takes a string (a sequence of characters between quotes) as a prompt to display to the user. It then waits until the user types a response, terminated by the user touching the Enter key. Finally, the function returns the user's response as a string.

If the user's response is supposed to be processed as a numeric value, the returned string must be converted into a number. When working with floating point values, a string is converted into a floating point number using the `float` function. The function accepts a string as its argument and returns the floating point number which the string represents. A typical interaction would be something like:

```
num_str = input( "Please enter a number: " )
num_float = float( num_str )
```

Suggested Procedure

- *Solve the problem using pencil and paper first.* You cannot write a program until you have figured out how to solve the problem. This first step is best done collaboratively with another student. However, once the discussion turns to Python specifics and the subsequent writing of Python, you must work on your own.
- Use IDLE to create a new program:
 - Use the required file name (“proj01.py”).
 - If you are in a CSE lab, select the H: drive as the location to store your file.
- Write a simple version of the program. Run the program and track down any errors.
- Use the **handin** system to turn in the first version of your program.
- Cycle through the steps to incrementally develop your program:
 - Edit your program to add new capabilities.
 - Run the program and fix any errors.
- Use the **handin** system to submit your final version.
- Be sure to log out when you leave the room, if you're working in a public lab.

*Be sure to save a copy of your completed program in your CSE file space (H: drive on the lab machines) **before** the project deadline. If you write your program at home and turn it in from home, you will need to copy it to your CSE file space **before** the deadline. In case of problems with electronic submission, an archived copy in the CSE file space is the only acceptable evidence of completion.*

Sample Output

```
Python 3.3.2 Shell
File Edit Shell Debug Options Windows Help
Python 3.3.2 (v3.3.2:d047928ae3f6, May 16 2013, 00:03:43) [MSC v.1600 32 bit (Intel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> ===== RESTART =====
>>>
Temperature (degrees F): 10.0
Wind speed (MPH): 15.0
Wind Chill Temperature Index: -6.5895344209562525

Temperature (degrees F): 0.0
Wind speed (MPH): 25.0
Wind Chill Temperature Index: -24.093780999553864

Temperature (degrees F): -10.0
Wind speed (MPH): 35.0
Wind Chill Temperature Index: -41.16894662953316

Please enter the temperature (degress F): 3.5

Please enter the wind speed (MPH): 18.0

Temperature (degrees F): 3.5
Wind speed (MPH): 18.0
Wind Chill Temperature Index: -16.47884113003356

>>>
```

Ln: 25 Col: 4