CS 150 Lab 5
More Debugging & Loops

The main objective of today's lab is to use the debugger to debug more complicated code. Further, the complexity of programs that we will write is going to increase now that we have loops to work with.

Be sure your output looks exactly like the specified output.
Be sure to submit the completed project to CS150-02 Lab when you are done.
Be sure to use the program skeleton and add comments to your code!

Show the instructor or TA your solution to each problem before submitting.

Lab 5.1

The following C++ code was written by a programmer trying to get cute. The code is tricky and not very readable; therefore, you are not to try and emulate this code in any way, BUT we need to know how this code works. The programmer was attempting to add the integers before a certain number and add the integers after a certain number up to some limit.

Examine the following code to solve the above problem:

```cpp
#include <iostream>

using namespace std;

int main ()
{
    const int MAX_VALUE = 5;
    const int BEFORE = 3;

    int count, sumBefore, sumAfter;

    count = sumBefore = sumAfter = 0;

    while (count < MAX_VALUE)
    {
        if (count++ < BEFORE)
        {
            sumBefore += count;
        }
        else if (count++ >= BEFORE)
        {
            sumAfter += count;
        }
    }

    cout << "Sum Before = " << sumBefore << endl;
    cout << "Sum After = " << sumAfter << endl;

    return EXIT_SUCCESS;
}
```

a) Trace the above program by hand and show what the output is from executing the above program? In doing so, show what the value of each of the following variables is after each iteration of the while loop. Do not use the computer for this part.

Iteration #	count	sumBefore	sumAfter

Show the instructor or TA before going on.

b) The above code exists in CS150-02 Public in a project called LoopDebug. Copy the project to your desktop and run the debugger stepping through the code one line at a time. What are the actual values of the variables after each iteration of the while loop?

Iteration #	count	sumBefore	sumAfter

Show the instructor or TA before going on.

c) Change MAX_VALUE to 100 and before to 10. What is the value of count, sumBefore, and sumAfter after exactly 15 iterations of executing the while loop.

count = _____

sumBefore = _____

sumAfter = _____

Show the instructor or TA before going on.

Lab 5.2

In lab 3 we did some temperature conversions but we could only enter a single fahrenheit temperature at a time and find the corresponding centigrade and kelvin temperature. It would be nicer to have a table of temperature values and subsequent conversions.

Create a project called **05_1_TemperatureTable** in your PUNetIDLabs solution that creates the following table of values:

```
        *******************************
        * Temperature Conversion Table *
        *******************************

        Fahrenheit       Centigrade       Kelvin
        ----------       ----------       ------
             32.0            XXX.X          XXX.X
             33.0            XXX.X          XXX.X

             ...

             52.0            XXX.X          XXX.X
```

Remember,

$$C = \frac{5}{9}(F - 32)$$

$$K = \frac{5}{9}(F - 32) + 273$$

Note1: Your program is to compile without any errors or warnings.

Note2: Do not use any magic constants in your program. Define your constants before defining the rest of your program's variables.

Once your projects are complete, place your solution PUNetIDLabs into the CS150-02 Drop folder on Turing. Your solution is to have all previous projects completely working and correct.