

CSci 1113: Introduction to C/C++
Programming for Scientists and Engineers
Homework 2
Fall 2018

Due Date: Wednesday, October 3, 2018 before 11:00pm.

Instructions: This is an individual homework assignment. There are two problems worth 20 points each. Solve the problem below by yourself (unlike the labs, where you work collaboratively), and submit the solution as a C++ source code file. Here are a few more important details:

1. Unlike the computer lab exercises, this is not a collaborative assignment.
2. Because all homework assignments are submitted and tested electronically, the following are important:
 - You follow any naming conventions mentioned in the homework instructions.
 - You submit the correct file(s) through Moodle by the due deadline.
 - You follow the example input and output formats exactly given in each problem description.
 - **Regardless of how or where you develop your solutions, your programs compile and execute on cselabs computers running the Linux operating system.**
3. You should test your program on other test cases (that you make up) as well. Making up good test cases is a valuable programming skill, and is part of ensuring your code solution is correct.

Problem A: It's getting hot in here (20 points)

Write a C++ program that will figure out how long it will take to heat/cool a room (using a simplified equation). Enter both the current temperature and the temperature being ventilated into the room. After 5 minutes, the two temperatures will "average". (So if the current room temperature is 70 degrees and you ventilate in 50 degrees, after 5 minutes the temperature will be $(70+50)/2 = 60$ degrees.) Have the program output the first time the room is within one degree of the ventilated temperature (at one of these 5 minute marks).

Example 1 (user input is underlined):

```
Initial room temperature:  
200  
Ventilated air temperature:  
42  
Time until temperature equalized:  
40
```

Example 2 (user input is underlined):

```
Initial room temperature:  
0  
Ventilated air temperature:  
42  
Time until temperature equalized:  
30
```

When you are done, name the source code file <username>_2A.cpp. Here you replace <username> with your U of M email address; for example, if your email address is smithx1234@umn.edu, your file should be named smithx1234_2A.cpp. Then submit your program using the HW 2 Problem A submission link in Moodle.

Problem B: HI! (20 points)

Write a C++ program that will make a picture that says “HI!”. Before running, ask what size the user wants. If the user inputs a number “N”, then both the “H” and “I” should take up a N by N square in the message. The exclamation point will be 1 by N (vertical).

The “H” should have X’s in the first and last column of the N by N square, along with X’s across the middle row. The “I” should be similar to the “H”, except rotated 90 degrees. The “!” Should be X’s up and down, except one blank space above the last row. There should be a single space between each letter/character. You can assume that we will only test this with odd sizes.

Example 1 (user input is underlined):

```
Size?  
3  
X X XXX X  
XXX X  
X X XXX X
```

Example 2 (user input is underlined):

```
Size?  
1  
X X X
```

Example 3 (user input is underlined):

```
Size?  
9  
X          X XXXXXXXXXXXX X  
X          X      X      X  
X          X      X      X  
X          X      X      X  
XXXXXXXXXX      X      X  
X          X      X      X  
X          X      X      X  
X          X      X  
X          X XXXXXXXXXXXX X
```

When you are done, name the source code file <username>_2B.cpp. Here you replace <username> with your U of M email address; for example, if your email address is smithx1234@umn.edu, your file should be named smithx1234_2B.cpp. Then submit your program using the HW 2 Problem B submission link in Moodle.