CSci 1113: Introduction to C/C++
Programming for Scientists and Engineers
Homework 7
Spring 2020

Due Date: Friday, April 10, 2020 before 11:55pm.

Instructions: This is an individual homework assignment. There are two problem 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. You must design, implement, and test the solution to each problem on your own without the assistance of anyone other than the course instructor or TAs. In addition, you may not include solutions or portions of solutions obtained from any source other than those provided in class: examples from the textbook, lectures, or code you and your partner write to solve lab problems. Otherwise obtaining or providing solutions to any homework problems for this class is considered academic misconduct. See the "collaboration rules" file on the class website page for more details, and ask the instructor if you have questions.

2. Because all homework assignments are submitted and tested electronically, the following are important:
   - You follow the naming conventions mentioned at the end of the problems.
   - You submit the correct file(s) on gradescope (https://www.gradescope.com/) 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 gradescope computers (which run Linux/Ubuntu operating system like the cselabs machines).**

3. The problem descriptions will usually show at least one test case and the resulting correct output. However, 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.

Introduction:
Both parts of this assignment use the simUniversity.cpp code provided on the website or here:
http://www-users.cselabs.umn.edu/classes/Spring-2020/csci1113/assignments/simUniversity.cpp

On larger pieces of code like this, it would be good to familiarize yourself with the structure at the high level, rather than walking through line by line. It might also be a good idea to run the program first to get an idea of what's happening, then dive into to code try to make a connection between what you saw and how it works.

Please ensure you do not have extra couts except for where explicitly specified. You can (and are encouraged) to use cout to help debug the code, just make sure you remove these before the final submission.

Problem A: Sim Win (20 points)
Right now you can only lose the game. Add functionality so that if you reach 100 smartness you can win the game. The format for this happening should be similar to the losing condition (if your entertainment reaches zero). You can put whatever you want before the "(Press enter to advance an hour)", but the last line in the program before it ends should be "You win!" (exactly).

Clarification: you do not need to account for a case where you both reach 100 smartness and have 0 entertainment. You can cout either "game over" or "you win".

Example 1 (user input is underlined):

(Lots of actions before this... and a picture that doesn't fit in here)

```
Current stats are: Energy = 80, Entertainment = 31, Smartness = 98.
Current time: 10:00.
You are at the University.
Do you want to (A)ttend class or (S)leep through lecture?
Do you want to (G)o to a different location or (Q)uit the game?
a

You take copious notes and pay close attention to the material.
From your actions changed your stats by... Energy: -4, Entertainment:
-20, Smartness: 2.
You graduate from college and become the envy of everyone!
(Press enter to advance an hour)<enter>
You win!
```

When you are done, name the source code file hw7A.cpp. Then log into gradescope and upload your file for the "Homework 7A" submission. **If you name your file incorrectly it will be unable to compile and run your code, so you will fail all test cases**. You may submit cpp files as many times as you want until the deadline to try and fix the code if you fail a test case. Following rigorous naming conventions and using test cases are something computer programmers often must do in "real life" programming , and so submitting your program with the correct name and functionality is part of doing this assignment correctly.

Problem B: Tired Sim (20 points)
"Energy" currently does not have much of an effect on anything. Modify the program to do the following:

- If "energy" is between 20 to 40 (inclusive), you get half the entertainment you normally would (rounded down).
- If "energy" is below 20, you get half the normal entertainment value (rounded down) and always lose 3 smartness for every action (including traveling) on top of any smartness change you would normally get. So if you would normally lose 2 smartness, if you have less than 3 energy you would lose 5 smartness.

You should use the energy value **after** you take an action. So for if you have "44 energy" and choose to "socialize outside" (which takes 8 energy), you should treat the energy as 36 and only get half the entertainment. (Doing it this way should be easier for you.)

The “half entertainment value” is only for positive entertainments. You still get the same negative entertainments, regardless of the “energy” level.

For example:

Case 1: If you have 70 “energy” and choose to “socialize outside”, you should lose 8 “energy” and gain 8 “entertainment”.

Case 2: If you have 30 “energy” and choose to “socialize outside”, you should lose 8 “energy” while only gaining 4 “entertainment”.

Case 3: If you have 0 “energy” and “socialize outside”, you will lose **0** “energy” (you would try to remove 8 like normal but you cannot go below 0), gain 4 “entertainment” and lose 3 “smartness”.

Case 4: If you have 10 “energy” and “do homework at the dorm”, you will lose 3 “energy” and lose 20 “entertainment” (no change to “smartness”).

Example 1 (for case 2, user input is underlined):

(Lots of actions before this... and a picture that doesn’t fit in here)

```
Current stats are: Energy = 30, Entertainment = 18, Smartness = 62.
Current time: 19:00.
You are at the Outside.
Do you want to (S)ocialize or (P)lay Rugby?
Do you want to (G)o to a different location or (Q)uit the game?
s

Party hard!
From your actions changed your stats by... Energy: -8, Entertainment:
4, Smartness: 0.
(Press enter to advance an hour)<enter>
```

(Bunch of ‘\n’s and a picture that doesn’t fit in here)

```
Current stats are: Energy = 22, Entertainment = 22, Smartness = 62.
Current time: 20:00.
You are at the Outside.
Do you want to (S)ocialize or (P)lay Rugby?
Do you want to (G)o to a different location or (Q)uit the game?
q

Stopping early, huh?
```

When you are done, name the source code file hw7B.cpp. Then log into gradescope and upload your file for the “Homework 7B” submission. **If you name your file incorrectly it will be unable to compile and run your code, so you will fail all test cases**. You may submit cpp files as many times as you want until the deadline to try and fix the code if you fail a test case. Following rigorous naming conventions and using test cases are something computer programmers often must do in “real life” programming, and so submitting your program with the correct name and functionality is part of doing this assignment correctly.