CSC 111 Assignment 7

NOTE: Your programs must compile and execute using the Eclipse environment in ECS 242. If you do your work on your own computer, be sure to test it in ECS 242 before you submit it.

Programming instructions

Assignment 7 involves 15 little exercises—the kind of code that you will be expected to write on the CSC 111 final exam. Most of these programming tasks require less than ten lines of C code. Some of the tasks will have a déjà vu feel to them—Assignment 7 is intended to be a sort of retrospective of the course.

The tasks are as follows:

1. Text parsing exercise—Convert Roman Numerals to integers using if statements statement (easy).
2. String manipulation exercise—Invert the capitalization of a string (e.g. "AbCd" becomes "aBcD") using a while loop, pointer arithmetic to step through the string, and string manipulation routines (easy).
3. Loop exercise—Find the largest Fibonacci number below a give limit (easy).
4. 1D array exercise—Linear search in an array of integers using a while loop (easy).
5. 2D array exercise—Generate n rows of Pascal's Triangle using two nested for loops over a 2D array (intermediate).
6. 2D array exercise—Shift a matrix one column to the left (hard).
7. String exercise—Compute the length of the string (easy).
8. String exercise— Copy a suffix of inputString to outputString (easy).
9. String exercise—Mirror" a string by concatenating it with a reversed copy of itself (intermediate).
10. String exercise—Decrypt a coded message (hard).
11. String exercise—Test whether a string is the same forwards and backwards (easy)
12. String exercise—Remove all of the vowels from a string (intermediate)
13. Struct exercise—Find the distance between two points in the plane (easy).
14. Linked list exercise—Count nearby points (intermediate).
15. Linked list exercise—Add a node at the of a singly linked list (intermediate)

Download the file `A7Template.c` from the CSC 111 website to implement Assignment 7. Do not be intimidated by the length of this template. You only need to modify the 15 functions that have the following line right after the function header:

```
/* ... Your code here ... */
```

You can probably complete the entire assignment with less than 100 lines of C code. In addition, the template contains detailed instructions for each programming task right before the function header. For example, here are the instructions for the first task:

```
/*
================================================
Task 1 - Text Parsing Exercise (easy)
Roman Numeral to Integer converter
Parameters:
s - A null-terminated string containing Roman Numerals.
No subtractive notation is used, so '9' is represented as 'VIIII'.
The only characters in s will be 'M','D','C','L','X','V' and 'I'
Return Value:
The positive integer value corresponding to the roman numeral representation.
Note that if the input string is empty (i.e. ""), the return value should be zero.
================================================
*/
```

The template also contains a large interactive testing suite, so you can test your implementations (i.e., by entering input values for each function and examining the output). To test only one of the 15 tasks, you have two options. You can skip over the tests for the other tasks by providing no input (i.e. just pressing Enter when prompted), or you can comment out the calls to the testing functions in `main`.

Assignment submission instructions

CSC 111 assignments will only be accepted electronically through the assignment page on the CSC 111 CourseSpaces site. Your submission will consist of ***one C source file*** named by the following convention: If your student ID is ***V00123456***, your C source files for Part 1 must be named **V00123456A7P1.c**. In addition, your ***full name, student ID,*** and ***Assignment name*** (e.g., Assignment 7) must appear in a ***comment section at the beginning of each C program***.

```
Name: Polar Bear (Replace this with your name)
UVicID: V00123456 (Replace this with your student number)
Date: 2017/11/20 (Replace this with the date you wrote the program)
Assignment: A7
File name: V00123456A6P1.c (Replace V00123456 with your student number)
Description: This program represents a CSC 111 retrospective
```

Please submit only the source file and not the executable file. To verify that you have submitted the correct file, you are strongly encouraged to download your submissions from the site and test that they work correctly in your Eclipse environment. Submissions that do not follow the guidelines above will receive a mark of zero.

Since this assignment only requires three source files, CourseSpaces will only allow you to submit three files. However, until the assignment due date, you may change your submission by deleting and resubmitting your source files multiple times. After the due date, no submissions will be accepted. When grading is complete, your assignment mark and comments will appear in the ***Gradebook*** section of CourseSpaces.