

CSE 2050 - Programming in a Second Language (C++)

Homework Assignment 2

September 1, 2015

1 Due Date

- September 8, by 11.59pm

2 Description

In this assignment, you will implement a number of small programs. These programs are simple and somehow repetitive. Here, you will:

- declare variables, choose the appropriate type for each variable. The names of variables should be descriptive (e.g., `interestRate`, `maximumValue`).
- you will implement simple mathematical calculations
- use the `cout` object to display results on the console. Use functions in `iomanip` to format the output. Use `cin` for standard input *only when it is explicitly requested*.
- use if-else, switch-case statement, loops

Your programs should contain a multi-line header comment similar to:

```
/*  
PROGRAM: CIRCLE.CPP  
Written by Bob the Great  
This program calculates the circumference of a circle.  
Last modification: 8/20/2010  
*/
```

3 Implementation Instructions

We provide a template for source files and make file that you *must* use. You will find the files in the directory `src/` which contains:

- a `.cpp` file for each question
- the driver header file
- an *incomplete* Makefile that builds multiple projects.

You will write your code inside the provided source files, and you will edit the makefile so it builds all programs. Each program *must* be a separate executable file.

You will submit:

1. only the source files (i.e., `.cpp` and `.h` files) and the associated Makefile. *Do not* submit `.o` files, executables, or test datasets.
2. files at point 1 (i.e. `.cpp` and `.h` files, and the Makefile) *must* be in the `src` directory compressed in the `src.tar.gz` file.

To compress the `src` directory, move to its parent directory (i.e. if you are inside `src` type `cd ..`), then type the following command on the linux terminal:

```
tar -zcvf src.tar.gz src
```

4 Questions

1. **Cyborg Data Type Sizes** You have been given a job as a programmer on a Cyborg super-computer. In order to accomplish some calculations, you need to know how many bytes the following data types use: `bool`, `char`, `int`, `long`, `float`, and `double`. You do not have any manuals, so you can't look this information up. Write a C++ function that finds the amount of memory used by these types and display the information on the screen.
Hint: use `sizeof` operator.
2. **Palindrome Number**
A palindrome number is a number that remains the same when its digits are reversed, that is, it is "symmetrical". Examples of palindromic numbers are: 12233221, 16461, 121,

66. Write a function that accepts a string `number` of digits and return `true` if `number` is palindrome, `false` otherwise. For this problem you can safely assume the input contains only numerals in the interval $[0 - 9]$, that is it is a valid number.

3. Personal Information

Write a function that asks as input and then displays the following pieces of information:

name
address, with city, state, and ZIP code
telephone number
college major

The *formatted* output should look similar to the following:

First Name:	Marcello	Surname:	Tomasini
Address:	150 University Blvd.	City:	Melbourne
ZIP Code:	32901	State:	FL
Phone Number:	+11234567890		
College Major:	Computer Science		

Use only a *single* `cout` statement to display all this information.

4. Fibonacci Sequence

In mathematical terms the sequence F_n of Fibonacci's numbers is defined by the recurrence equation:

$$F_n = F_{n-1} + F_{n-2}$$

with seed values $F_0 = 0$, $F_1 = 1$.

Write a function that accepts as parameter a positive integer n , compute F_n using a for loop, and return F_n . Return -1 if input is not valid.

5. Roman Numeral Converter

Your GSA is Italian, so he knows roman numeral but not arabic numeral system. Help him by writing a function that accepts as parameter an integer number within the range of 1 through 10, and return the string literal representing the roman numeral (that is one of I, II, III, IV, V, VI VII, VIII, IX, X). Return the string `none` if input is not valid. Use a `switch-case` statement to implement the Roman Numeral Converter.