

Kerry Ojakian's CSI 32 Class

Due Date: Sunday March 24 by 5pm

HW #4

General Instructions: Write all your responses (including programs) on paper, doing the questions in order. Scan all your responses to ONE pdf file and put in a folder called HW04 in Dropbox.

The Assignment

The following class (that we used) will be needed for some problems below.

```
class Simple {
public:
    // CONSTRUCTOR
    Simple(int y) {
        x = 2*y;
    }

    int get() {
        return x;
    }

    void change(int y) {
        x = y;
    }
    // declaring internal data
    int x;
};
```

1. Suppose the call to function f on input 3 produces the value 5. Suppose that on input 5, the function f returns 3.
 - (a) What is the value of the expression $1 + 2 * f(3)$
 - (b) What is the value of the expression $1 + 2 * f(5)$
 - (c) Suppose x is declared to be an int, and x is initialized to 5. What is the value of x after running the following line of code:

$$x = f(x) + x;$$

- (d) Suppose x is declared to be an int, and x is initialized to 5. What is the value of x after running the following line of code:

$$x = f(x) + f(x - 2) + x;$$

- (e) What is the value of $f(f(f(3)))$?
(f) What is the value of x after running the following code.

```
int x = 3;
for (int i = 10; i < 1000; i++) {
  x = f(x);
}
```

- Write a program that takes an integer as user input and then prints out "BCC" that many times, with a space between each occurrence. For example, if the user inputs 3, then the print out should be: BCC BCC BCC
- Write a function which takes a vector of floats as input and returns the string "EVEN" if the vector has an even length and the string "ODD" if it has an odd length.
- Write a function which takes a vector of ints as input and returns the sum of the numbers in the vector.
- Recall the class Simple from class (it appears above). Write the definition of a function E which takes two inputs: 1) an object of type Simple, and 2) an int. The function E returns true if the integer is equal to the internal data in the object, and false otherwise.
- Write the definition of a function D which takes one input: an object of type Simple. The function D returns a new object of type Simple whose data value is double of the given one (example: if the given object had an internal value of 4, then the new returned one should have a value of 8).

7. Write the definition of a function H which takes two inputs: 1) an object of type Simple, and 2) a vector of ints. The function H returns a new object of type Simple whose data value is set to the maximum value in the vector.
8. Write the definition of class Rectangle that has:
 - Data members length and width, of type double, each of which defaults to 1.
 - The constructor, that takes two doubles (the length and the width)
 - Function members setLength, setWidth, that set the length and width of the rectangle.
 - Function member perimeter that returns the perimeter of the rectangle.
 - Function member area that returns the area of the rectangle.
9. Write the definition of class Die that has:
 - The constructor, that takes one int n (the number of sides), which will have values $1, 2, \dots, n$.
 - Function member *get* returns the current value of the die.
 - Function member *roll* returns nothing, but randomly chooses a new value for the die among $1, 2, \dots, n$ (for this part you will need the *rand* function which we will discuss in class).
10. Use the last class Die, to do the following simulation: Create a 6-sided die, roll it 1000 times, finding the average value over these rolls. Write your code here. AND - Write it in C++ and indicate three distinct results you get.
11. Write a function that takes a string as input and returns true if the string alternates '0' then '1', and false otherwise. For example F("0101010") returns true, while F("010110") returns false.