­CSCI 3232 Systems Software Assignment 4

Upload all your files to the associated dropbox in Folio before the deadline --- **11:30PM Feb 16, Sunday, 2020.**

**Note:** Make all your codes compilable and runnable under Ubuntu. Do not put your codes in Word or PDF documents. Make them separate source files (.h, .c, .cpp etc) as you would compile them. **Include a single Makefile to compile all your programs. Make sure you have tested that your makefile works.**

1. (20 pts) What is the output of the following C++ program? You should be able to tell the output **without** running the program.

#include <iostream>

using namespace std;

class programming {

protected: int variable;

public:

programming() {

cout << "In constructor\n"; input\_value(100);

}

programming(int a) {

cout << "In constructor\n"; input\_value(a);

}

~programming() {

cout << "In destructor\n";

}

void input\_value(int b) {

cout << "In input\_value " << b << "\n"; variable = b;

}

void output\_value() {

cout << "Variable is " << variable << "\n";

}

void onemorefunction() {

if(variable%2) cout<< "Variable is odd\n";

else cout<< "Variable is even\n";

}

};

programming ob(2);

int main(int argc, char \*argv[])

{

programming object;

ob.onemorefunction(); object.output\_value();

return 0;

}

output:

In constructor

In input\_value 2

In constructor

In input\_value 100

Variable is even

Variable is 100

In destructor

In destructor

1. (35 pts) Write a C++ program A4p2.cpp with a class of your own design. The class should contain a protected **int** member variable *var*, which is initialized with an integer value between 1 and 50 in a constructor that takes an integer parameter. The class should contain a public member function called *play* that should print out a sequence of integers as a result of iteratively applying a math function *f* to the member variable *var* together with the length of this sequence. The function *f* is defined as f(x)=(3x+1)/2 if x is odd and f(x)=x/2 if x is even. Stop the iteration when the value 1 is reached. (Example: When *var* is 6, the *play* function’s output sequence should be 6,3,5,8,4,2,1 and the length of this sequence is 7.) In your main function create an object of this class whose member *var* should be initialized through constructor with the first command line argument to your program (i.e., argv[1]) and then call the *play* member function on the object. You can check whether the supplied first command line argument is an integer between 1 and 50 in your main function. A sample run can look like the following. Submit source code A4p2.cpp and you don’t need to submit a screen shot.

[kwang@computer][~/temp]$./A4p2 6

6 3 5 8 4 2 1

Length of the sequence: 7

1. (35 pts) Write a C++ program A4p3.cpp with a class that is a derived class of your class from problem 2. Add a private **int** member variable *var2* to this class. Initialize the member variables *var* and *var2* with values between 1 and 50 using a constructor that takes two integer parameters. Add a public member function called *getsp* that should print out the sum and product of *var* and *var2*. In your main function, create an object of this class, initialize its members *var* and *var2* through constructor with the first two command line arguments to your program (i.e., argv[1] and argv[2]) and then call the *play* and *getsp* member functions on the object. A sample run can look like the following. Submit source code A4p3.cpp and you don’t need to submit a screen shot. Please do **NOT** just submit A4p3.cpp because it seems to include all functionality of A4p2.cpp. You need to submit two separate program source files.

[kwang@computer][~/temp]$./A4p3 6 8

Iterated integer sequence for 6 is:

6 3 5 8 4 2 1

Length of the sequence: 7

Sum of 6 and 8 is 14. Product of 6 and 8 is 48.

1. (10 pts) If there is any syntax error in the following C++ program, point out the error(s) and give justifications. If you believe there is no error, then write the outputs. You should be able to figure out the answer **without** compiling or running the program.

#include <iostream>

using namespace std;

int main(int argc, char \*argv[])

{

int arr[2][3]={{25,16,9},{58,49,45}};

int \*b[2]={arr[0],arr[1]};

std::cout<<arr[0][2]-\*(\*(arr+1)+1)<<std::endl;

std::cout<<b[0][2]-\*(\*(b+1)+1)<<std::endl;

return 0;

}

output:

-40

-40

1. Note: You need to supply a single **makefile** to compile your programs in both problems 2 and 3. Without a correct makefile, up to 5 points will be deducted. Do as requested: do **not** combine programs 2 & 3 into one program just because they share some parts. As stated in the last slide of 3\_Pointers\_Functions.pptx, it is OK to rename your makefile as makefile.txt before uploading it to Folio.

Checklist of files to be submitted: A4p2.cpp, A4p3.cpp, makefile, solution file for problems 1 & 4.