CMPS 147 - Summer 2017 Mid Term Exam

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This exam is open book, open notes, and open computer/internet. You are permitted to use any computer you wish to complete the exam. No communication / collaboration with anyone is permitted (other than emailing me if you have questions).

The exam consists of two programs, along with several written questions. Please upload your programs (**.cpp file**) to Moodle. Please write the answers to the written questions within this document and submit it to Moodle as well..

You have 180 minutes to complete this exam.

# Problem 1 - **Program** (30 Points):

Write a program that calculates the final sales price of a car, which includes additional optional packages along with sales tax. You may assume that the **base** price of the car is $30,000.

First ask the user to choose which optional packages they want. For the purposes of this program, the user is only permitted to choose **one** package. Your program should display a menu of the available packages. **The user should enter the package by entering the letter associated with it**.

A - Basic Model (+$0.00)

B - All-Wheel Drive Package ($2,500)

C - Sport Package (+$3,500)

D - Luxury Interior (+5,000)

E - Self Driving / Self Aware (+12,000)

If the user enters an invalid letter, **you must continue asking them** to enter a letter until they enter a valid choice.

Once they’ve entered a valid letter, then ask them for the sales tax rate in their state. You should clearly indicate if they should enter, for example, 7 or 0.07 for a 7% sales tax.

Finally, your program should compute the final sales price as the base price, plus the price of the chosen package, all multiplied by 1 + sales tax rate. For example, if the user chooses option D and there is a sales tax of 5%, then the final price would be $35,000 \* 1.05 = $36,750.

Your printout need not include , placeholders, but should be limited to two decimal places to indicate proper dollars/cents notation.

# Problem 2 - **Program** (30 Points):

Write a program that calculates the sum of the first N numbers that meet **each** of the following criteria:

1. Must be divisible by 13 or 5
2. Must be greater than 0.

The user should enter “N”, and you should print out (one on each line) each number you find that meets these criteria as you add them together.

For example, if the user enters 10 this is the output you should expect:

5

10

13

15

20

25

26

30

35

39

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3)Which of the following set the variable x to be a random number between 1 and 50 (assume the random number generator has already been properly “seeded”)? **(5 points)**

a) x = rand()/50 + 1; b) x = rand() % 50;

c) x = rand(1,50); d) x = rand()%50 + 1;

4) Which of the following best describes the relationship between if/else and switch statements :

**(5 points)**

a) All if/else if/else sequences can be written as switch statements

b) All switch statements can be written as if/else if/else sequences

c) if/else if/else sequence are less flexible than switch statements

d) None of the above

5) Which of the following loop structures is best when you can express the number of times the loop should repeat using with a simple variable or expression? **(5 points)**

a) while c) for

b) do while d) All

6) Write a loop that will go around “n-1 times” (assuming n is an integer that has already been initialized). No need to write anything inside the loop. You should choose the *most* appropriate loop structure for this problem. **(10 points)**

for (i = 0; i <= (n - 1); i++) {

}

7) Replace the indicated portion of the program below with an equivalent switch statement:

**(10 points)**

#include <iostream>

using namespace std;

int main() {

int x;

cout << "Please enter x: ";

cin >> x;

///// Replace the following with an equivalent switch ///////////////////////////////

if ( x == 6 || x == 7) {

cout << "A" << endl;

}

else if (x == 5) {

cout << "B" << endl;

}

else if (x == 4) {

cout << "C" << endl;

}

else {

cout << "D" << endl;

}

switch (x) {

case 6:

case 7:

cout << "A" << endl;

break;

case 5:

cout << "B" << endl;

break;

case 4:

cout << "C" << endl;

break;

default:

cout << "D" << endl;

}

//////////////////////////////////////////////////////////////////////////////////////

}

8) Construct a single **for loop** to print out the following lines. You may use as many variable as you

wish, but you may not use multiple loops. **(10 points)**

4 4 4

8 2 7

16 1 10

32 0.5 13

64 0.25 16

#include <iostream>

#include <iomanip>

using namespace std;

int main() {

double x, y, z;

x = 4;

y = 4;

z = 4;

do {

cout << x << setw(5) << y << setw(5) << z << endl;

x \*= 2;

y /= 2.0;

z += 3;

} while (x <= 64);

}

9) Given numeric variables x, y, and z (initialized elsewhere in the program), create an if/else if/else sequence to produce the desired results. **(20 points)**

* If x is less than or equal to y, and y is less than or equal to z, print out "Ascending Order".
* If x is greater than or equal to y, and y is greater than or equal to z, print out "Descending Order".
* If x, y, and z are all equal, print out "All three numbers are equal"
* If x, y, and z are not ordered - print out "These number are not ordered!"

Note, your sequence should print out only **one** message about the entered numbers!

For example, if the user enters 2, 2, 2, then your program should say: "All three numbers are equal". If the user enters 2, 2, 4, then you program should say: "Ascending Order", and if the user enters 4, 2, 2, the program should say: "Descending Order".

#include <iostream>

using namespace std;

int main() {

int x, y, z;

cout << "Please enter three integers: ";

cin >> x >> y >> z;

// YOUR CODE HERE

if (x == y && y == z) {

cout << "All three numbers are equal" << endl;

}

else if (x >= y && y >= z) {

cout << "Descending Order" << endl;

}

else if (x <= y && y <= z) {

cout << "Ascending Order" << endl;

}

else {

cout << "These numbers are not ordered!" << endl;

}

}