Name: (as it would appear on official course roster)
UCSB email address: **@ucsb.edu**
Lab Section Time:
Optional: name you wish to be called if different from above
Optional: name of "homework buddy" (leaving this blank signifies "I worked alone")

Homework 03: Loops and Functions

Assigned: *Tuesday, October 20th, 2020*
Due: *Monday, October 26th, 2020 by 11:59 PM*
Points: *75 (normalized to 100)*

- You may collaborate on this homework with AT MOST one person, an optional "homework buddy".
- MAY ONLY BE TURNED IN ON **GRADESCOPE as a PDF file**. Instructions on How to Submit (applicable to ALL homework assignments in this class) are on Piazza.
- There is NO MAKEUP for missed assignments.
- We are strict about enforcing the LATE POLICY for all assignments (see syllabus).
- **IMPORTANT:** If you use code techniques we have NOT covered in class, you will **get a zero grade** on that problem. If you cheat, or have someone else do your work, you will **get an F in the class**.
  Only use the space provided for answers. Use clear and clean handwriting (or typing).

Reading: Read all of Chapters 3 and 4.

1. (10 pts) Consider this program snippet:

```
int x(10);
while (x-- >= 3)
{
      cout << x << " ";
      if (!(x % 3))
      {
            cout << "Buzz! ";
            if ((x % 2) == 0)
            {
                  cout << "Fizz!";
            } // if
      } // if
      else
      {
            cout << "..." << endl;
      } // else
} // while
```

   a. (3 pts) Write what this code will print out exactly in the box above.

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b. (7 pts) Explain step by step ***why*** the program prints out what it does.

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2. (5 pts) Explain the difference between these 2 pieces of code containing a for-loop:

```
for (int i  = 0; i  < 10; i++)
{
   cout << i;
}
```

```
int i;
for (i  = 0; i  < 10; i++)
{
   cout << i;
}
```

3. (6 pts) Consider the code below:

```
int a = 7, b = 9;
cout << "Here is ";
while (a++ % b != 0)
{
      cout << a << " ";
      b += 2;
      a -= 2;
}
cout << endl;
```

   a. (2 pts) What is the actual outcome of this code?

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b. (4 pts) How is the value of variable **b** changing? Show your work!

4. (6 pts) Given a function definition as follows:

```
int functionX(char letter, int n1, int n2)
{
	if ((letter == 'z' && n1 == 9) || n2 == 3)
	{
		return n2+2*n1;
	}
	else
	{
		return n1-n2;
	}
}
```

What is the result of the following calls? **Show your work!**

a) `cout << functionX('y', 9, 3);`

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b) `cout << functionX('x', -3, 3) - functionX('z', 1, -3);`

5. (15 pts) Consider the following main() program:

```
int main() {
   int x=10, y=20, z=30;
   shift(x, y, z);
   cout << x << " " << y << " " << z << endl;
   return 0;
}
```

The body of the function **`shift()`** is as follows:

```
{
   int temp;
   temp = var1;
   var1 = var2;
   var2 = var3;
   var3 = temp;
}
```

What will this program print for each case given below for the declaration/definition of the function **`shift()`** and explain **WHY**?

a) Declaration/Definition: `void shift(int& var1, int var2, int var3)`

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b) Declaration/Definition: `void shift(int var1, int& var2, int& var3)`

c) Declaration/Definition: `void shift(int& var1, int& var2, int& var3)`

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6. (10 pts) Find 5 mistakes in this C++ code, mark them (circle them, put an arrow, etc...), and label each as "logic" or "syntax" error.

```
#include <iostream>;
use namespace std;
int main ()
	int a(0);b(0);
	cout << "Enter a number that is either 0 or 1: ";
	cin >> a;
	cout << "Enter another number that is less than 5: ";
	cin >> b;
	switch (a)
	{
		case 0:
			cout << "number is zero.\n";
			// print this 5 times
			for (int i = 5; i != 5; i--)
			{
				cout << "extra line " << i << endl;
			}
			break;
		case 1:
			cout << "number is one.\n";
			// print only if b is over 5
			if (b > 5)
			{
				cout << "Han shot first!\n";
			}
		break;
	}
	return 0;
}
```

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7. (10 pts) Complete this entire C++ program that asks the user to enter a number of different coins: quarters (25 cents), dimes (10 cents), and nickels (5 cents) and then outputs the total monetary value of the coins in cents. For example, if the user enters 2 for the number of quarters, 3 for the number of dimes, and 1 for the number of nickels, then the program should output that the coins are worth 85 cents. The program keeps asking until the user enters **0** for all inputs, at which point, it quits.

   You have to fill in *exactly* 5 missing pieces indicated below by the lines. Be clear about space characters.

```
#include <iostream>
using namespace std;

_____________________________________

    int q(1), d(0), n(0), sum;


    while ____________________________________________________________
    {
        cout << "Enter number of quarters, dimes, and nickels " <<
                "separated by space characters (all 0s to quit): ";


        ____________________________________________________________


        sum = ____________________________________________________


        cout << "That's worth_____________________________cents in total!\n";

    }// end while


    return 0;
}
```

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8. (13 pts) Which of these array declarations is **NOT** legal to do in C++ (assume ver. 11, which is what the textbook and lecture do). Explain **why** you chose each of your answers.

```
a) int res[3];
b) int res[3] = {-1};
c) int res = {-1, 0, 1};
d) int bnb[];
e) int number = 5, array[number];
f) double emdee[5][3][2][2];
g) bool bl[4] = {'true'};
h) string str[3] = {"maya", "sally", "suha"};
i) int fx[2][2] = {{1,1},{0,0}};
j) int gx[][2] = {0};
k) int hx[2][] = {0};
```