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Lab 4

Lab 4.1

Source Code:

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

int main()
{
	int num1;
	int num2;

	cout << "Please enter the first integer" << endl;
	cin >> num1;

	cout << "Please enter the second integer" << endl;
	cin >> num2;

	cout << "num1 = " << num1 << " and num2 = " << num2 << endl;

	if (num1 == num2){
      cout << "The values are the same" << endl;
		cout << "Hey, that’s a coincidence!" << endl;
```

```
    }
        else{
            cout << "The values are not the same" << endl;
        }
        return 0;
}
```

Output:

```
Please enter the first integer
4
Please enter the second integer
4
num1 = 4 and num2 = 4
The values are the same
Hey, that's a coincidence!
```

Question Answer:

The initial problem with the program was in the first if statement, = the assignment operator was used instead of == the comparison operator to compare the values of num1 and num2. This was fixed by changing the operator in the condition statement to ==. The program was then changed to assign a value to num2 from user input instead of initializing it with value of 5. The third change to the program was adding another cout statement that said "The values are the same" if the first if condition was true. The fourth change to the original program was changing the two single line if statements without the curly braces into a single if/else statement.

Lab 4.2

Source Code:

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

int main()
{
	float average;

	cout << "Input your average:" << endl;
	cin >> average;

	if (100.00 >= average && average >= 90.00){
		cout << "You got an A" << endl;
	}

	else if (89.00 >= average && average >= 80.00){
		cout << "You got a B" << endl;
  }

  else if (79.00 >= average && average >= 70.00){
		cout << "You got a C" << endl;
  }

  else if (69.00 >= average && average >= 0.00){
		cout << "You fail" << endl;
  }
```

```
    else {
        cout << "Invalid input" << endl;
    }

            return 0;
}
```

Output:

Input your average:

92

You got an A

Question Answer:

This program has two one line if statements that do not have curly braces. If the average from the user input is 60, the console will output nothing. This is because the two if statements are average<60 and average>60. There is no <= or >=. This is fixed by adding the correct operator to one of those if statements. The second exercise was to make the two if statements into a single if/else statement. The third exercise changed the code by adding several else if statements with the range of each letter grade and output a letter grade if the average meets the condition for that letter grade.

Lab 4.3

Source Code:

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

int main()
```

```
{
        char year;
        float gpa;

        cout << "What year student are you ?" << endl;
        cout << "Enter 1 (freshman), 2 (sophomore), 3 (junior), or 4 (senior)"
        << endl << endl;
        cin >> year;

        cout << "Now enter your GPA" << endl;
        cin >> gpa;

        if (gpa >! 2.0 && year == '4')
                cout << "It is time to graduate soon" << endl;

        else{
                cout << "You need more schooling" << endl;
   }
        return 0;
}
```

Output:

What year student are you ?

Enter 1 (freshman), 2 (sophomore), 3 (junior), or 4 (senior)

4

Now enter your GPA

4.0

It is time to graduate soon

Question Answer:

The gpa >= 2.0 can be rewritten using the not operator by writing it like: gpa !< 2.0 in the first exercise. The second exercise consists of changing the operator from != to another one. This one was not able to be written another way because ‘4’ is a char data type, and using < or > does not work with that data type. For the third exercise if the if and if else statement swap the || and the && operator, in order for the condition to be true in order to graduate, the user needs to only have a gpa higher than 2.0 or be in year 4. In the fourth exercise the program can be adjusted to use else instead of else if, and include the string literal in the cout statement inside the else block.

Lab 4.4

Source Code:

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

int main()
{
        char grade;

        cout << "What grade did you earn in Programming I ?" << endl;
        cin >> grade;

  if (grade == 'A'){
    cout << "an A - excellent work !" << endl;
  }
  else if (grade == 'B'){
    cout << "you got a B - good job" << endl;
  }
  else if (grade == 'C'){
```

```
    cout << "earning a C is satisfactory" << endl;
  }
  else if (grade == 'D'){
    cout << "while D is passing, there is a problem" << endl;
  }
  else if (grade == 'F'){
    cout << "you failed - better luck next time" << endl;
  }
  else {
    cout << "You did not enter an A, B, C, D, or F" << endl;
  }


        return 0;
}
```

Output:

What grade did you earn in Programming I ?

A

an A - excellent work !

Question Answer:

For the first exercise, by removing all of the break; statements from the switch statement, the program executes all of the cases instead of the case of the input. This shows why break; is necessary after the statement for the specific case. In the second exercise, the switch statement can be replaced by a series of else/if statements.

Lab 4.5.1

Source Code:

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

int main()
{
   float q1;
   float q2;
   float q3;
   float q4;
   float avgbill;

   cout << fixed << setprecision(2) << showpoint;

   cout << "Please enter quarter 1 water bill:" << endl;
   cin >> q1;

   cout << "Please enter quarter 2 water bill:" << endl;
   cin >> q2;

   cout << "Please enter quarter 3 water bill:" << endl;
   cin >> q3;

   cout << "Please enter quarter 4 water bill:" << endl;
   cin >> q4;
```

```
    avgbill = (q1 + q2 + q3 + q4) / 4;
    cout << "Average yearly bill : $" << avgbill << endl;

    if (avgbill >= 25 && avgbill <= 75){
        cout << "A normal amount of water is being used.";
    }
    else if (avgbill > 75){
        cout << "An excessive amount of water is being used.";
    }
    else if (avgbill < 25){
        cout << "Commendation received for conserving water this year!";
    }
    return 0;
}
```

Output:

```
Please enter quarter 1 water bill:
64.69
Please enter quarter 2 water bill:
13.37
Please enter quarter 3 water bill:
48.24
Please enter quarter 4 water bill:
75.59
Average yearly bill : $50.47
A normal amount of water is being used.
```

Question Answer:

This program was accomplished by assigning user input values into each of the four quarterly water bill variables, and if/else statements were used to comment on the value of the average of the four quarters.

Lab 4.5.2

Source Code:

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

const double DISCOUNT1 = 0.10;
const double DISCOUNT2 = 0.15;
const double DISCOUNT3 = 0.20;
const double DISCOUNT4 = 0.25;
const double PRICE = 12.00;

int main()
{
   int shirts;
   double cost;
   double discount;
   double total;

   cout << fixed << setprecision(2) << showpoint;
```

```
cout << "Enter the amount of shirts purchased:" << endl;
cin >> shirts;

if (shirts > 5 && shirts < 10){
   cost = (shirts * PRICE);
   discount = (cost * DISCOUNT1);
   total = (cost - discount);
   cout << "You bought " << shirts << " shirts. Your total is $" << total;
}
else if (shirts > 11 && shirts < 20){
   cost = (shirts * PRICE);
   discount = (cost * DISCOUNT2);
   total = (cost - discount);
   cout << "You bought " << shirts << " shirts. Your total is $" << total;
}
else if (shirts > 21 && shirts < 30){
   cost = (shirts * PRICE);
   discount = (cost * DISCOUNT3);
   total = (cost - discount);
   cout << "You bought " << shirts << " shirts. Your total is $" << total;
}
else if (shirts > 31){
   cost = (shirts * PRICE);
   discount = (cost * DISCOUNT4);
   total = (cost - discount);
   cout << "You bought " << shirts << " shirts. Your total is $" << total;
}
else if (shirts < 5){
   cost = (shirts * PRICE);
```

```
        cout << "You bought " << shirts << " shirts. Your total is $" << cost;
    }
    else {
        cout << "Please enter a nonnegative number" << endl;
    }

    return 0;
}
```

Output:

```
Enter the amount of shirts purchased:
40
You bought 40 shirts. Your total is $360.00
```

Question Answer:

This exercise wanted us to create a program that will calculate a price with a certain discount that applies within a certain range of amount of shirts being bought. The discount amount varies per each range. If/else statements were used to calculate the price and discounts fir each range of shirts based on what the user input for number of shirts.

Lab 4.5.3

Source Code:

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

```
const int INSTATETUITION = 3000;
const int OUTSTATETUITION = 4500;
const int HOUSEINSTATE = 2500;
const int HOUSEOUTSTATE = 3500;

int main()
{
   char state;
   char housing;
   int tuition;

   cout << "Please input 'y' if you are from in-state and 'n' if you are from out of state." << endl;
   cin >> state;

   cout << "Please input 'y' if you require on campus room and board and 'n' if you do not." << endl;
   cin >> housing;

   if (state == 'y' && housing == 'y'){
      tuition = INSTATETUITION + HOUSEINSTATE;
      cout << "Your cost for this semester is: $" << tuition << endl;
   }
   else if (state == 'y' && housing == 'n'){
      tuition = INSTATETUITION + 0;
      cout << "Your cost for this semester is $" << tuition << endl;
   }
   else if (state == 'n' && housing == 'y'){
      tuition = OUTSTATETUITION + HOUSEOUTSTATE;
      cout << "Your cost for this semester is $" << tuition << endl;
```

```
    }
    else if (state == 'n' && housing == 'n') {
        tuition = OUTSTATETUITION + 0;
        cout << "Your cost for this semester is $" << tuition << endl;
    }
    else {
        cout << "Please enter 'y' or 'n' for the prompts.";
    }

    return 0;
}
```

Output:

```
Please input 'y' if you are from in-state and 'n' if you are from out of state.
y
Please input 'y' if you require on campus room and board and 'n' if you do not.
y
Your cost for this semester is: $5500
```

Question Answer:

This exercise was a simple exercise that took two variables and output a cost based on combinations of inputs from the two variables. This was done using a series of if/else statements.