CS 150 Lab 3

If statements and Arithmetic

The main objective of today's lab is to use `if` statements to solve a complex problem.

- Be sure your output looks exactly like the specified output.
- Be sure to submit the completed project to **CS150-02 Lab** when you are done.
- Be sure to use the program skeleton and add comments to your code!
- Show the instructor or TA your solution to each problem before submitting.
- You do not need to submit the challenge question!

Lab 3.1

- **Show the instructor or TA the answers to questions 1-3 before writing any code**

For this lab you will need to write a program called 'Lab03_1_XXXXXXXX', where XXXXXXXX is your PUNetID, which will calculate how many hours you spent on your first programming assignment. If you worked less than one hour on your project, your output should not mention hours. Your output should always mention minutes, even if it says "0 minutes."

Sample Input/Output

```
*******************
| Time Calculator |
*******************
Hello, what is your name?  Frank
How many minutes did you spend on your first assignment? 91

Frank, you worked 1 hours and 31 minutes on your assignment!
```

Sample Input/Output

```
*******************
| Time Calculator |
*******************
Hello, what is your name?  Frank
How many minutes did you spend on your first assignment? 59

Frank, you worked 59 minutes on your assignment!
```

Note: We have shown you two possible outputs of the program. If you have any questions on what the output should look like for a given input, ask the instructor or TA.

1) Briefly describe the data that your program will need to use.

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2) List the variable declarations necessary to store the data listed in 1.

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3) What decision statements will you need to use in your program? For EACH decision statement specify what logical and/or relational expressions you will need to use for said decision statement.

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- **Show the instructor or TA the solution before submitting it to the drop box**

Lab 3.2

Save this project as 'Lab03_2_XXXXXXXX', where XXXXXXXX is your PUNetID. The goal of this program is to solve the following problem:

> Forest Grove Auto has a shiny new website that allows you to answer a few simple questions and receive an estimate on how much a new car would cost. You need to build the logic that asks the user this series of questions and calculates the estimated price
>
> Sample output is on the following page as well as a description of the available options.

- **Show the instructor or TA the answers to questions 1-3 before writing any code**

1) Briefly describe the data that your program will need to use.

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2) List the variable declarations necessary to store the data listed in 1.

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3) What decision statements will you need to use in your program? For EACH decision statement specify what logical and/or relational expressions you will need to use for said decision statement.

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Sample Input/Output UPDATED!

```
*************************************
* Forest Grove Auto Price Estimator *
*************************************

What is your name: Bob

What make of car do you want [SUV, sedan, hatchback]? hatchback

Do you want 2 wheel drive or 4 wheel drive [2/4]? 4

Do you want a custom paint job [Y/N]? N

Is this the first time you have bought a car [Y/N]? N

Taxes will be: $ 1000

How much money will you provide as a down payment? 1500.00

Bob, your hatchback will cost you a total of $ 11000
After the down payment you owe: $ 9500

Enjoy your hatchback!
```

►All cars cost $7,000. SUVs have an extra transport charge of $10,000. A four wheel drive car costs $3,000 extra. A custom paint job costs an extra 10% of the cost of the car, before discounts or taxes (but including the four wheel drive cost). If you are a first time car buyer, you get a $2,000 discount.

Cars that cost over $8000 pay a 10% luxury tax.

- **Show the instructor or TA the solution before submitting it to the drop box**

►Output Formatting: Challenge!

Be sure to submit the above code before working on the challenge. The challenge does not need to be submitted! Once you have the program working and submitted, go back and update the code to output the dollars correctly, with two numerals to the right of the decimal place. To output numbers with exactly two number to the right of the decimal place, as in 22680.00, you need to include the **<iomanip>** library and use the fixed and setprecision(2) functions as shown below. The **`fixed << setprecision(2)`** must occur immediately before the double you want to output.

```
#include <iomanip>

double money = 22680.00;

cout << fixed << setprecision(2) << money;  // this displays: 22680.00
```

Challenge, # 2!

For this lab you will create a new Visual Studio Project that will contain your source code. Save this project as 'Lab03_Challange_XXXXXXX', where XXXXXXXX is your PUNet ID. The goal of this program is to determine if a given year is a leap year or not. You do not need to submit this assignment!

> A year is a leap year if it is divisible by 4. The only exception to this is if it is a century year. Then it is a leap year only if it is divisible by 400. In case you're wondering, these are the rules for the Gregorian calendar, which began to be adopted in 1582 when they realized that having a leap year every 4 years resulted in the days of the year being very off after a several centuries. (The actual length of a year is 365.24219 days, not an even 365.25 days).

You need to determine a single relational expression that represents the above rules and use this in your program. You must specify your own input and output for this problem. The program should accept a single year as input and output either "Leap year" or "Not a Leap year."

Don't forget to answer questions 1-3 for this challenge!

1) Briefly describe the data and information that your program will need to use.

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2) List the variable declarations necessary to store the data and information listed in 1.

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3) What decision statements will you need to use in your program? For EACH decision statement specify what logical and/or relational expressions you will need to use for said decision statement.

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Notes for the Challenge:

> C++ has logical operators that allow you to create more complex *relational expressions*. These include the **and operator** (&&) and the **or operator** (**||**). The *and operator* is two ampersand characters, the *or operator* is two vertical pipes (the shift of the backslash key).
>
> An and operator is true **only if both** operands are true, an or operator is true **if at least one** operand is true.

You can use these in the following way:

```
int x = 9, y = 99;
bool result;

result = (y>x) && (x != 1); //the value stored in result is True
result = (y>x) && (x == 1); //the value stored in result is False
result = (y==x) || (x == 1);//the value stored in result is False
result = (y>x) || (x == 1); //the value stored in result is True
```

Note: These challenges make great exam study questions!