Lab 3: Conditionals: if, else, switch

Conditionals are statements that allow a program to take different actions depending on specific conditions. For example, most programs do different things depending on what the user inputs. Without conditionals every program would do exactly the same thing every time it ran.

The most common conditionals in C/C++ are the if, the if-else, and the switch statement constructs.

The structure of the if statement is:

```c
if( predicate )
{
    // statements to be executed if the predicate is true.
}
```

The rest of the program.
This is always executed.

(Note the indenting that follows the if and the else statements. As with most formatting in C/C++ this is not required for the program to compile correctly, but it does make the program more readable; without proper indenting it is almost impossible for a person to understand what a program does. You will lose points if you don’t correctly indent your programs.)

The structure of the if-else structure is:

```c
if( predicate )
{
    // statements to be executed if the predicate is true.
}
else
{
    // statements to be executed if the predicate is false.
}
```

The rest of the program.
This is always executed.

The left and right curly braces (or brackets) defining the block after the if and the else can be omitted if only a single statement is used after the if or the else. For example,
if( predicate )
    // single statement to be executed
The rest of the program.
This is always executed.

Many programmers choose to put them in, even though they are not required because they may need them later when more code is added (for testing or debugging purposes).

If the predicate in the if statement is zero it is treated as false, otherwise it is treated as true. Thus, the predicate can be anything that C/C++ can interpret as an integer. However, to make your programs readable the predicate should generally be a test of some kind, such as \( X < Y \), which is true if \( X \) is less than \( Y \) and false otherwise.

**Exercise 3.1**

This experiment is a simple introduction to if and if-else statements. As always, reuse as much of the code from previous labs as would be helpful.

1. Write a program that allows the user to enter two integers and then tells the user which of the two values is smaller. For example, if the user entered the integers 5 and 6 the output should be something like:
   
   *5 is the smaller number.*

   As always include your name, date, and the lab number as a comment at the beginning of the program. As always test the program with several different sets of input values to make sure that it runs properly.

2. What happens if the user enters two numbers that are the same?

3. If necessary fix the program so that it gives a ‘reasonable’ output if the user enter two numbers that are the same.

4. If you used only simple if statements in your program, rewrite it to use if-else constructs. If you already used if-else constructs, rewrite your program to use only if statements.

5. You should turn in two programs and output showing the test cases for both programs. The two programs are the program that uses if’s and the program that uses if-else’s.