

CS 150 Lab 4

Logical Operators and If/Else

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 4.1

- **Show the instructor or TA the answers to questions 1-2 before writing any code**

For this lab you will need to write a program called 'Lab04_1_XXXXXXXX', where XXXXXXXX is your PUNetID. For this assignment, you must use an **if/else** statement, **logical operators**, and **output formatting**.

The average temperature for September in Oregon is: **62** degrees Fahrenheit. You need to write a project that will ask the user for two temperatures (whole numbers). The software then needs to display exactly one of the following messages. Be sure to choose the message that appropriately describes the data.

- Both temperatures are above average!**
- Neither temperature is above average.**
- Only the first temperature is above average.**
- Only the second temperature is above average.**

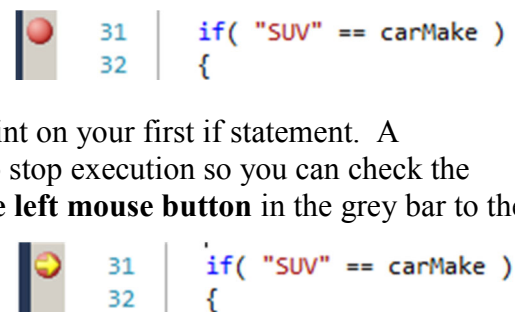
Sample Input/Output

```
*****
| Temperature Compare-O-matic |
*****
Please give me two temperatures: 100 30

Only the first temperature is above average.
```

The Debugger

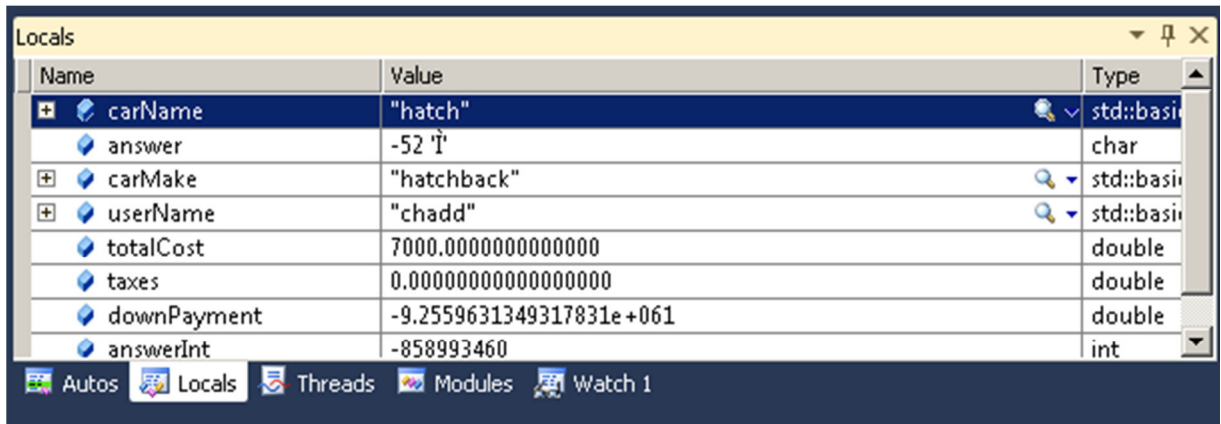
After you finish your program you need to practice using the **debugger**. The debugger allows you to execute your code one line at a time so you can watch the code's execution. This helps you find and fix bugs in your program. To start debugging set a breakpoint on your first if statement. A **breakpoint** marks a line in the code where you want the debugger to stop execution so you can check the values of the variables in your program. To set a breakpoint **click the left mouse button** in the grey bar to the left of the if statement. A red dot should appear. Set a breakpoint on your return statement as well.



Now press F5 or use the Debug menu to **Start Debugging**. Your program should run until it hits the first

breakpoint. A yellow arrow will cover the red dot on this breakpoint.

If you place your mouse cursor over a variable, a small message should pop up showing you the current value of that variable. At



the bottom of the screen, the **Locals** tab will display the current value of each local variable you have declared.

To continue execution, press the **Step Over** button at the top of the window. This will execute the current line and move the yellow arrow to the next line that will be execute. The Step Over button is the icon on the far right of the following image.



If you want to run your program until you hit the next breakpoint, press the green triangle (**Continue**) in the above image.

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

2) 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.

- Show the instructor or TA the solution before submitting it to the drop box
- Show the instructor or TA your mastery of the debugger before continuing.

Lab 4.2

- 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 'Lab04_2_XXXXXXXX', where XXXXXXXX is your PUNetID. For this assignment, you must use an **if/else** statement and **logical operators**.

A right triangle, shown at right, is a triangle where one of the three angles is 90 degrees. An interesting trait of a right triangle is the fact that the squares of the two sides add up to the square of the hypotenuse, the side opposite the right angle. The hypotenuse is always the longest of the three sides. For this project, you need to use these facts to determine if a triangle is a right triangle. You will be given the length of each side and must determine which side is potentially the hypotenuse. In the figure $a^2 + b^2 = c^2$.

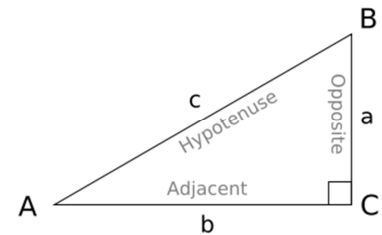


Figure 1
<http://mrhiggins.net/algebra2/wp-content/uploads/2008/05/righttri2.png>

Sample Input/Output

```
*****
| Right Triangles! |
*****
Please give me the length of all three sides: 3 5 4

This is a right triangle! The hypotenuse is length 5!
```

Sample Input/Output

```
*****
| Right Triangles! |
*****
Please give me the length of all three sides: 1 1 2

This is not a right triangle!
```

Other triangles to try: 10 8 6; 7 13 10; 2 4 4;

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

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

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.

Challenge!

Forest Grove Auto wants you to update their website price estimator! Build a new Visual Studio project named Lab04_Challenge_XXXXXX, where XXXXXXXX is your PUNet ID.

The website (input and output) looks exactly the same as in Lab03_2, however the cost of each of the options has changed as follows:

Hatchbacks cost \$5,000, sedans cost \$6,000 and SUVs cost a total of \$15,000 (the transport cost is gone!). A four wheel drive SUV costs \$5,000 extra, a four wheel drive hatchback or sedan is \$2,000 extra. A custom paint job on an SUV costs 12% extra, a custom paint job on a sedan costs 11% extra, a custom paint job on a hatchback costs 5% extra. Remember the paint job cost is calculated before discounts or taxes but including the four-wheel drive cost. If you are a first time car buyer, you still get a \$2,000 discount.

Cars that cost over \$10,000 pay a 12% luxury tax, cars that cost \$8,000 or more but less than \$10,000.01 pay a 9% tax, and cars under \$8,000 pay a 3% tax.

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.

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

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.

Note: These challenges make great exam study questions!