Practicing if and switch

<https://csci-1301.github.io/about#authors>

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This lab serves multiple goals:

* To reinforce your understanding of if statements,
* To help you practice switch statements,
* To help you understand the instances in which switch or if should be used,
* (Optional) to help you understand the conditional operator, and
* (Optional) to introduce you to the ToUpper method.

# Mastering the switch statement

Consider the following code:

// We ask the user to enter the day of the week:  
Console.WriteLine("Please enter the day of the week.");  
// Note that anything that is not spelled exactly as   
// in the switch statement will be treated as the   
// default case.  
  
// We read from the user:  
string string\_day = Console.ReadLine();  
  
// Variable where the result of our computation will be stored:  
int num\_day;  
  
// Switch statement to map textual description of the day   
// (e.g., "Monday", "Tuesday", etc.) to a number   
// relative to chronological order (e.g., 1, 2, etc.)  
switch (string\_day)  
{  
 case ("Monday"):  
 num\_day = 1;  
 break;  
 case ("Tuesday"):  
 num\_day = 2;  
 break;  
 case ("Wednesday"):  
 num\_day = 3;  
 break;  
 case ("Thursday"):  
 num\_day = 4;  
 break;  
 case ("Friday"):  
 num\_day = 5;  
 break;  
 case ("Saturday"):  
 num\_day = 6;  
 break;  
 case ("Sunday"):  
 num\_day = 7;  
 break;  
 default:  
 num\_day = -1; // This is an error code.  
 break;  
}  
  
// We display the number corresponding to the day entered:  
Console.WriteLine("The number corresponding to " + string\_day + " is " + num\_day + ".");

You can download it [as a solution](labs/IfAndSwitch/day_of_the_week.zip) (that also contains the solution to the problems asked below. Make sure you open day\_of\_the\_week and not day\_of\_the\_week\_solution first).

Now, do the following:

1. Test the program with various values and make sure it behaves as expected.
2. Comment out the default: case along with the two lines below it and compile your program. Why is the compiler complaining?
3. Restore the code to its original state.
4. Change the code so that “monday” would make the value 1 get assigned to num\_day.
5. Change the code so that [the days of the week start on Sunday](https://www.wikiwand.com/en/Names_of_the_days_of_the_week#Days_numbered_from_Sunday) (i.e., “Sunday” causes the value 1 to get assigned to num\_day, “Monday” causes the value 2 to be assigned to num\_day, etc.)
6. Finally, change the last message to tell the user if the code encountered an error; use an if statement to display a different message if the user input did not match one of the literals in your switch statement.

Here is an example of execution, where the user input is u͟n͟d͟e͟r͟l͟i͟n͟e͟d͟, and hitting “enter” is represented by ↵:

Please enter the day of the week.  
t͟u͟e͟s͟d͟a͟y͟↵  
The number corresponding to tuesday is 3.

Here is a second example:

Please enter the day of the week.  
M͟O͟N͟D͟A͟Y͟↵  
I am sorry, but MONDAY does not seem to be a valid day.

You can find an example solution in [this solution](labs/IfAndSwitch/day_of_the_week_solution.zip) or in the archive that you downloaded previously.

# Practicing if and switch

This exercise will ask you to write a rather abstract program that performs simple manipulations on a few variables. The main goal is to have you practice “transforming” if statements into switch statements and switch statements into if statements. This will help you memorize their syntax and help you choose the more convenient one to perform certain tasks.

Create a new project and do the following in Main.

1. Declare and initialize the following variables:
   * a string variable named day
   * an int variable named myVar
   * a char variable named initial, and
   * a bool variable named flag
2. Set and change the value of these variables to make good tests as you progress through this problem.
3. You can also display them on the screen to make sure that your statements behave as expected.

## From switch to if-else

1. Write a switch statement that sets flag to true if the value of day is "Mon", "Tue", "Wed", "Thu" or "Fri", and to false otherwise.
2. Rewrite the previous statement as an if-else statement.

## From if-else to switch

1. Write an if-else statement that doubles the value of myVar if myVar is: 3, 5, or 7.
2. Can you rewrite the previous statement as a switch statement? If so, do it. If not, explain why not.

## Deciding Between Condition Types

1. Write a statement that doubles the value of myVar and sets initial to 'M' if day is equal to "Sat". What is the appropriate kind of statement to do this?
2. Write a statement that displays “Hello” on the screen if the value of initial is 'E' or 'e', “Bonjour” if the value of initial is 'F' or 'f', and “Guten Tag” if the value of initial is 'D' or 'd'. What is the appropriate kind of statement to do this?

Note that you can solve those problems with either an if statement or a switch statement.

## Complex Conditions

1. Write a statement that doubles the value of myVar if day is "Sun", triples the value of myVar if day is not "Sun" but initial is 'a', or sets myVar to 0 if neither of the other conditions is satisfied.
2. Write a statement that sets myVar to 0 if initial is an upper-case letter or to 1 otherwise. You will need to understand how to use the IsUpper method, and the [documentation](https://docs.microsoft.com/en-us/dotnet/api/system.char.isupper?view=net-5.0) can help you with that.

Note that you can only solve those problems with if statements.

# Pushing Further (Optional)

## Conditional Operator

A *conditional operator* can be used to replace if-else statements in particular cases (i.e., assignment, call, increment, decrement, and new object expressions). Its structure is:

condition ? first\_expression : second\_expression;

You can read more about it [in the documentation](https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/operators/conditional-operator).

Practice using the conditional operator by adding these statements to the program you developed previously:

1. Write a statement that sets myVar to 0 if initial is an upper-case letter, and to 1 otherwise. You already wrote an if statement that accomplishes this in the previous exercise, so you just need to rewrite it using the conditional operator.
2. Write a statement that sets initial to 'B' if myVar is greater than 500 and to 'S' if myVar is less than or equal to 500.
3. Write a statement that doubles the value of myVar if day is "Sat" or "Sun" and adds 1 to the value of myVar otherwise.

## ToUpper() Method

C# contains a method called ToUpper() in the string class. You can read [its documentation](https://learn.microsoft.com/en-us/dotnet/api/system.string.toupper?view=net-6.0), but the simplest way to understand is probably to see an example first. The statement

Console.WriteLine("Hello, world!".ToUpper());

will display

HELLO, WORLD!

Can you use this method to make your switch statement [from the first part](#mastering-the-switch-statement) accommodate any combination of uppercase and lowercase letters for the days of the week? If done properly, your program should then correctly identify that “MoNdAy”, “MONDAY”, “monday” and “Monday” all match the same value.