Introduction

This lab gives you practice with if statements (also sometimes called conditional, or selection statements. In the process, you'll also get some more experience with Boolean operators. The idea is the following: your goal is to write a program that recommends what clothing items to wear based on the weather conditions indicated by a user.

If you have questions, be sure to ask the TA: your TA is there to help you! By now you’ve seen how to use Thonny on both your Windows and Linux accounts. You are free to select whichever operating system you want to use.

1 Setup

We recommend creating a new directory/folder called lab3 on your N drive (Windows) or in your home directory (Linux). In your lab3 directory, create a new Python file clothing_picker.py.

2 Unary Selection

Unary selection is a fancy name for a simple if statement. You’ve seen these already in lecture: the if statement allows you to execute a sequence of statements (or a code block) if a given boolean expression evaluates to True, or skip over the code block if the expression evaluates to False.

The code block inside an if statement must contain one or more statements. In Python, the code block associated with an if statement is distinguished by indenting lines of code immediately underneath the line containing the if keyword of the selection statement. The syntax and structure of a unary selection statement are shown below:

```python
if boolean_expression:
    statement_1
    statement_2
    statement_3
```

For this first version, write a single unary selection statement that checks whether the user has specified whether it is windy or not. If it is windy, the program should tell the user not to bring an umbrella. Pseudocode and sample input and output for this first version of your program are given below.

- Ask the user if it is windy
Figure 1: Sample output for the initial version.

- Save user input into a variable
- If it is windy, print “Don’t bring an umbrella because it’s windy.”
- If it is not windy, do nothing

3 Binary Selection

We’ve also discussed binary selection, which is a fancy name for an if/else statement. It has an if clause and an indented code block just as in unary selection, but it also has an else clause and code block that is executed whenever the Boolean expression in the if clause evaluates to False. The syntax and structure of a binary selection statement are shown below, where statements 1 through 3 are the code block for the if clause, and statements 4 and 5 constitute the code block for the else clause.

```python
if boolean_expression:
    statement_1
    statement_2
    statement_3
else:
    statement_4
    statement_5
```

Next, modify your code so that it still prompts the user to answer whether it is windy, but this time if the answer is “no”, then have the program output, “It is not windy. Bring an umbrella if you wish.” If it is windy, the program should output the same as before. Sample input and output for this second version of your program is shown below.

Figure 2: Sample output, Binary Selection
4 Boolean expression with logical operators

We’ve discussed in lecture how to use more complicated boolean expressions; specifically, the logical operators or, and, and not were presented. Modify your code to also prompt the user to for whether it is sunny or cloudy. Retain the if, else code as you’ve already written, except change the Boolean expression to check if it is windy and sunny. If the user specifies yes, then the output should be “It’s windy and sunny, so bundle up and don’t bring an umbrella.” If it is not both windy and sunny, have the program output, “It is not both windy and sunny.”

Pseudocode for the revised version of your program is shown below. Sample output is shown in Figure 3.

- Ask user if it is windy, save input into a variable
- Ask user if it is sunny or cloudy, save input into a second variable
- If it is windy and sunny, output “It’s windy and sunny, so bundle up and don’t bring an umbrella.”
- Otherwise, output “It is not both windy and sunny.”

Note: Here and in all further parts of the lab, you may assume that the user responds to the sunny/cloudy prompt with the exact input "sunny" or "cloudy"; you do not need to handle other inputs. Also notice that the instructions above are phrased only in terms of sunny and not sunny.

Figure 3: Sample output for boolean expression with logical operators
5 Nested if statements

As shown in lecture, it is possible to nest an entire selection statement (if statement with an else clause) inside of a code block of an existing if statement. The syntax is shown in below. To make it easier to see, a box has been drawn around the outer-most and inner-most if statements.

```python
if boolean_expression_1:
    if boolean_expression_2:
        statement_1
    else:
        statement_2
else:
    statement_4
    statement_5
```

Modify your code so that the outer condition (boolean_expression1) checks if it is windy, and the inner condition (boolean_expression2) checks whether it is sunny. If it is windy and sunny, print “It is windy and sunny.”; if it is windy and not sunny, print “It is windy and not sunny”; if it is not windy, print “It is not windy.” Sample output is shown In Figure 4.

![Figure 4: Output of program with nested conditionals](image)

6 Clothing picker: chained conditionals

One more possible clause in a conditional statement an elif clause. An elif, which is short of else if, contains a Boolean expression that is checked ONLY if the first if’s condition, and all preceding elif conditions all evaluate to False. Unlike an else, whose code block is ALWAYS executed if the if condition evaluates to False, the code block of an elif is executed only if the conditional of the elif evaluates to True. Note that including an else is never syntactically required; an if statement can have zero or more elif clauses and zero or one else clause. In the program you submit, you should make sure you’re demonstrating at least one use of an else clause.

This time, have your program prompt the user to ask if it is sunny, and also ask for the temperature. Modify your program so that the else code block has a nested if statement as
Table 1: Sample input/output combinations

<table>
<thead>
<tr>
<th>Sunny</th>
<th>Temperature</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Less than 60 degrees</td>
<td>Wear a sweater</td>
</tr>
<tr>
<td>Yes</td>
<td>60 degrees exactly</td>
<td>Woo hoo, it is 60 degrees. Wear what you want</td>
</tr>
<tr>
<td>Yes</td>
<td>More than 60 degrees</td>
<td>Wear a t-shirt and flip flops</td>
</tr>
<tr>
<td>No</td>
<td>Less than 40 degrees</td>
<td>Wear a coat and hat</td>
</tr>
<tr>
<td>No</td>
<td>Between 40 and 50 degrees</td>
<td>Not quite freezing, but close. Bundle up</td>
</tr>
<tr>
<td>No</td>
<td>50 degrees exactly</td>
<td>A jacket is best</td>
</tr>
<tr>
<td>No</td>
<td>More than 50 degrees</td>
<td>Wear a long sleeved shirt</td>
</tr>
</tbody>
</table>

well. Both of the nested if statements will now have if, elif, and else clauses (see sample below). The outer condition should check whether it is sunny, and inner if/elif/else should make recommendations according to the temperature and whether or not it is sunny. Don’t forget to convert the temperature input to an int and recall that you can use comparison operators like <= and >= to get the boolean result of numerical comparisons.

Write appropriate conditions that rely on the user’s input (whether it is sunny and the temperature), and write appropriate print statements that produce the clothing recommendations indicated in Figure 5.

![Figure 5: Schematic of logic for clothing picker](image)

Table 1 shows the sunny/temperature combinations and their corresponding output value (clothing recommendation) that your program should print. Sample output is shown in Figure 6.

Submission

Upload clothing_picker.py to Canvas for grading.
Figure 6: Sample clothing picker program output. Note that this does not display all possible cases in the table above, but your program must work for all of them.

Rubric

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your file is called <code>clothing_picker.py</code></td>
<td>1 point</td>
</tr>
<tr>
<td>The top of <code>clothing_picker.py</code> has comments including your name, date, and a short description of the program’s purpose. Comments placed throughout the code explain what the code is doing.</td>
<td>3</td>
</tr>
<tr>
<td>Your program makes use of <code>if</code>, <code>elif</code>, and <code>else</code>.</td>
<td>6</td>
</tr>
<tr>
<td>Your program correctly prompts the user and stores the user’s input.</td>
<td>3</td>
</tr>
<tr>
<td>Your code provides unique clothing combinations for each of the sunny/temperature combinations in the table in this lab handout.</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>20 points</td>
</tr>
</tbody>
</table>