Control and Iteration

CONTROL AND ITERATION

COMPUTER SCIENCE 88

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1 Control

Control structures direct the flow of logic in a program. For example, conditionals (if-elif-else) allow a program to skip sections of code, while iteration (while), allows a program to repeat a section.

1.1 If statements

Conditional statements let programs execute different lines of code depending on certain conditions. Let’s review the if-elif-else syntax:

```python
if <conditional expression>:
    <suite of statements>
elif <conditional expression>:
    <suite of statements>
else:
    <suite of statements>
```

Recall the following points:

- The else and elif clauses are optional, and you can have any number of elif clause.
- A conditional expression is a expression that evaluates to either a true value (True, a non-zero integer, etc.) or a false value (False, 0, None, etc.).
- Only the suite that is indented under the first if/elif that has a conditional expression that evaluates to True will be executed.
- If none of the conditional expressions are True, then the else suite is executed. There can only be one else clause in a conditional statement!
1.2 Boolean Operators

Python also includes the boolean operators and, or, and not. These operators are used to combine and manipulate boolean values.

- `not` returns the opposite truth value of the following expression.
- `and` short-circuits at the first False value and returns it. If all values evaluate to True, the last value is returned.
- `or` short-circuits at the first True value and returns it. If all values evaluate to False, the last value is returned.

```python
>>> not None
True
>>> not True
False
>>> -1 and 0 and 1
0
>>> False or 9999 or 1/0
9999
```

1.3 Questions

1. Determine what the Python interpreter will output given the following lines of code.

```python
>>> from operator import add, mul
>>> mul(add(5, 6), 8)
>>> print('x')
>>> y = print('x')
>>> print(y)
>>> print(add(4, 2), print('a'))

def foo(x):
    print(x)
    return x + 1

def bar(y, x):
    print(x - y)

>>> foo(3)
>>> bar(3)
```
>>> bar(6, 1)

>>> bar(foo(10), 11)

2. Vandana will only wear a jacket outside if it is below 60 degrees or it is raining.

Write a function that takes in the current temperature and a boolean value telling if it is raining and returns True if Alfonso will wear a jacket and False otherwise.

First, try solving this problem using an if statement.

```python
def wears_jacket_with_if(temp, raining):
    """
    >>> wears_jacket_with_if(90, False)
    False
    >>> wears_jacket_with_if(40, False)
    True
    >>> wears_jacket_with_if(100, True)
    True
    """
```

Note that we’ll either return True or False based on a single condition, whose truthiness value will also be either True or False. Knowing this, try to write this function using a single line.

```python
def wears_jacket(temp, raining):
```
3. To handle discussion section overflow, TAs may direct students to a more empty section that is happening at the same time.

Write a function that takes in the number of students in two sections and prints out what to do if either section exceeds 30 students.

**Hint:** You can do `str(<number>) + <string>` to concatenate a number and a string

```python
def handle_overflow(s1, s2):
    """
    >>> handle_overflow(27, 15)
    No overflow
    >>> handle_overflow(35, 29)
    Move to Section 2: 1
    >>> handle_overflow(20, 32)
    Move to Section 1: 10
    >>> handle_overflow(35, 30)
    No space left in either section
    """
```