Python 3 Control Structures

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1 Decision Making

1.1 Topics Covered

(i) `if/elif/else`

(ii) `for` loop

(iii) `range`

(iv) `while` loop

1.2 `if/elif/else` Statement

- `if` statement only executes when Boolean expression is True

- `elif` statement executes if `if` statement & above `elif` statements are false; tests series of conditions

- `else` statement only executes if all above condition(s) are false

```
1    # To compare floats w/o rounding, test the difference & compare to tolerance value
2    tolerance = 0.001
3    if abs(float_val_1 - float_val_2) <= tolerance:
4        print('equal')
```

2 Loops

2.1 `for` Loops

- `for` loop → when you know how many times to repeat code: `count ctrld`

- `for` loop repeats code for every element in given seq

- Can use for strs, lists, tuples, sets

- `range(start, stop, step)`

  - Up to, but not including, `stop`
  - Must always include `stop`, `start` & `step` are optional

```
1    # print chrs that come b4 s/S alphabetically
2    >>> for char in 'CMPUT':
3    ...     if char.lower() < 's':
4    ...         print(char, end='*')
5    'C*M*P*'
```

2.2 `while` Loops

- `while` loop → when you know how many times to repeat code: `condition ctrld`

- `while condition`: execute fn → condition will be evaluated to true/false

- Repeat action until user enters specific value: a **sentinel** value

```
1    >>> SENTINEL = 0
2    >>> total = 0
3    >>> num = -1 # initialize -> diff from sentinel
4    >>> while num != SENTINEL:
5    ...     num = int(input('Enter value to add; 0 to stop > '))
6    ...     total += num
7    ... print('Sum of values entered by user is', total)
```

- BEWARE of the ∞ loop; something inside loop should eventually make `while` condition `False`

  - i.e., *at least one thing related to condition expression must be updated each iteration*

- Can also use ctrl value

```
1    # Should prolly use a for loop for this scenario (more Pythonic)
2    >>> total = 0
3    >>> my_list = [10, -2, 3, 24]
4    >>> i = 0 # INITIALIZE control variable
5    >>> while i < len(my_list):
6    ...     total += my_list[i]
7    ...     i += 1 # UPDATE control variable
8    ... print('Sum of elements is', total)
9    Sum of elements is 35
```

2.3 break

- Avoid using `break`: better to use Boolean flags b/c code easier to read

- Don't use break in this class

2.4 Nested Loops

```
1    >>> for row in range(3):
2    ...     print(row, end=": ")
3    ...     for col in range(5):
4    ...         print(col, end=" ")
5    ... print()
6    0: 0 1 2 3 4
7    1: 0 1 2 3 4
8    2: 0 1 2 3 4
```