COMP10001 Foundations of Computing
Semester 1, 2021

Tutorial Questions: Week 6

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Discussion

1. In what situations would we use a "dictionary". How is it structured, how do we add and delete items?
2. What is the difference between using the `.pop()` method on a dictionary and using it on a list?
3. In what situations would we use a "set"? How does it differ from other "containers" such as lists and dictionaries?
4. What special operations can we perform on sets? How do we add and remove items from them?

   Now try Exercises 1–2
5. What do we mean by "mutability"? Which data types are mutable out of those we've seen?
6. What is `None`? How is it used?
7. What is the difference between `sorted()` and `.sort()` when applied to a list? What does it mean to edit an object "in-place"?

   Now try Exercise 3
8. What is a "namespace"?
9. What do we mean by "local" and "global" namespace? What is "scope"?

   Now try Exercise 4

Exercises

1. Evaluate the following given the assignment `d = {"R": 0, "G": 255, "B": 0, "other": {"opacity": 0.6}}`. If `d` changes as a result, give its new value. Assume `d` is reset to its original value each time.

   (a) `"R" in d`
   (b) `d["R"]`
   (c) `d["R"] = 255`
   (d) `d["A"]`
   (e) `d["A"] = 50`
   (f) `d.pop("G")`
   (g) `d["other"]["blur"] = 0.1`
   (h) `d.items()`

2. Evaluate the following given the assignment `s1 = {1, 2, 4}` and `s2 = {3, 4, 5}`. If `s1` or `s2` change as a result, give their new value. Assume `s1` and `s2` are reset to their original values each time.

   (a) `s1.add(7)`
   (b) `s1.add(2)`
   (c) `s2.remove(5)`
   (d) `s1 & s2`
   (e) `s1.union(s2)`
   (f) `s1 - s2`

3. What is the output of this code? Why?

```
def mystery(x):
    x.append(5)
    x[0] += 1
    print("mid-mystery:", x)

my_list = [1,2]
print(my_list)
mystery(my_list)
print(my_list)
mystery(my_list.copy())
print(my_list)
```

4. What is the output of the following code? Classify the variables by which namespace they belong in.

```
def foo(x, y):
    a = 42
    x, y = y, x
    print(a, b, x, y)

a, b, x, y = 1, 2, 3, 4
foo(17, 4)
print(a, b, x, y)
```

Problems

1. Write a function which takes a string as input and prints the frequency of each character in the string using a dictionary.
2. Write a function which takes two lists as input and returns a list containing the numbers which they both have in common.
3. Write a function which takes a dictionary and returns a sorted list containing the unique values in that dictionary.
4. Write a function which takes a string, a character and an integer threshold and returns `True` if the character appears in the string with a frequency above the threshold, `False` if it appears below the threshold, and `None` if it doesn't appear at all.