

Dictionaries and Functions

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Course Overview

Reminders

- Signup for the quiz or submit a conflict request
- Practice quiz is up

Mini Review

Poll Question: Functions

How many values will this function return if foo is called and bar is of type string?

```
def foo(bar):  
    if type(foo) == str:  
        return "lion"  
    return "cheetah"
```

- ☐ A 0
- ☐ B 1
- ☐ C 2
- ☐ D Another number

Poll Question: List Copying

How many list objects exist after this code executes?

```
w = [1, 2, 3, 4]
x = w
y = x[:]
z = y[0]
```

- ☐ A 0
- ☐ B 1
- ☐ C 2
- ☐ D 3

Poll Question: Boolean

What type does the following function return?

```
def qux(baz):  
    return baz[0] == 'folded'
```

- ☐ A list
- ☐ B integer
- ☐ C boolean
- ☐ D string

Poll Question: Sorting

What is the value of `z` after this code has executed?

```
x = [9, 12, 13, 4, 8, 13, 19, 6]
z = x.sort()[0]
```

- ☐ A 0
- ☐ B 4
- ☐ C 19
- ☐ D Error

Sorting

- `list.sort()` → Updates the *original* list in place and returns `None`.
- `sorted()` Doesn't modify the original list. Returns a *copy* of the list that is sorted.

Common Errors in EiPE Questions

Code Reading Error Types

Error 2

Error 1

```
def f(x, y):  
    z = 0  
    for val in x:  
        if val==y:  
            z += 1  
    return z
```

```
# x is a string  
# y/z are single  
    character  
    strings  
def f(x, y, z):  
    k = x.find(y)  
    y = x.find(z)  
    return x[k+1: j]
```

Error 3

```
def f(x):  
    for i in range(len(x)):  
        if x[i] % 2 == 0:  
            x[i] = 2 * x[i]
```

- Ⓐ **Error 1 - Too Low Level:** for every value in x, add 1 to z if that value is equal to y,, then return z.
- Ⓑ **Error 2 - Type Mismatch:** returns the slice of a string from index y, incremented by 1, until, but not including index z.
- Ⓒ **Error 3 - Ambiguity/Imprecision:** Double the even indexes in list x

Dictionaries

In Review

- Consists of key:value pairs.
- Why do we care? Tracking relationships between things.

```
name_map = {  
    "dhsmith2" : {  
        "first" : "David",  
        "second" : "Smith"  
    },  
    "zilles" : {  
        "first" : "Craig",  
        "second" : "Zilles"  
    }  
}
```

```
def informal_email(names_dict, netid):  
    email = "Dear {0}, I wanted you to know ..."  
    return email.format(names_dict[netid]['first'])  
  
email_text = informal_email(name_map, "dhsmith2")
```

Poll Question: Dictionaries

What is the value of `x` after the following function is called?

```
def get_item_counts(some_list):  
    counts = {}  
    for item in some_list:  
        counts[item] += 1
```

```
x = get_item_counts(["This", "This", "This", "Is", "A"])
```

- ① {"This": 3, "Is": 1, "A": 1}
- ② {This: 3, Is: 1, A: 1}
- ③ {"This": "3", "Is": "1", "A": "1"}
- ④ KeyError

Dictionaries: Computing a Histogram

Creating a count map of items in a collection is a common dictionary pattern:

```
def get_item_counts(some_list):  
    counts = {}  
    for item in some_list:  
        if item not in counts:  
            counts[item] = 1  
        else:  
            counts[item] += 1
```

Dictionary Functions

Functions for iteration:

- ❶ `dict.items()` → Generates tuples of all of the key value pairs in the dictionary.
- ❷ `dict.keys()` → Generates all of the keys in the dictionary.
- ❸ `dict.values()` → Generates all of the values in the dictionary.

Functions for modification:

- ❶ `dict.clear()` → Clears all the key value pairs from the dictionary.
- ❷ `dict.get(key, default)` → Tries to lookup the value associated with a key and gives default if key not found.
- ❸ `dict1.update(dict2)` → Merges the key:value pairs from dict1 into dict2.
- ❹ `dict.pop(key, default)` → Removes the key:value pair, returns the value, default if key not found.

Functions

Poll Question: Function Parameters

What is the value of `result` after the following code is run?

```
def arithmetic(x = 2, y = 3, z = 4):  
    return x * y * z  
result = arithmetic(1, z=5)
```

- ☐ A 10
- ☐ B 20
- ☐ C 24
- ☐ D 30
- ☐ E Some other value
- ☐ F Error

Function Returns

Functions can (kind of) return multiple values by putting them all in a tuple.

```
def return_first_and_last(a_list):  
    return (a_list[0], a_list[-1])  
x, y = return_first_and_last([1, 2, 3])
```

Poll Question: Function Args and Mutability

What is the value of `x[0]` after this code executes:

```
def remove_first(a_list):  
    a_list = a_list[1:]  
  
x = [1, 2, 3, 4]  
remove_first(x)
```

- ☐ A 1
- ☐ B 2
- ☐ C 3
- ☐ D 4
- ☐ E Something else
- ☐ F An error occurs

Poll Question: Functions

What, if anything, gets printed to the screen after this code executes?

```
def add1(x): return x + 1
def mul2(x): return x * 2

x = 1
fns = [add1, mul2, mul2, print]
for f in fns:
    x = f(x)
```

- ☐ A Nothing
- ☐ B 1
- ☐ C 4
- ☐ D 8
- ☐ E Something else
- ☐ F SyntaxError

Poll Question: Scope

What are the values of `w`, `x`, `y` and `z` after this code executes?

```
x, y, z = (7, 5, 10)
```

```
def a_function(y):  
    x = 2 * y  
    return x * z
```

```
w = a_function(x)
```

- ☐ A 50, 7, 5, 10
- ☐ B 100, 10, 5, 10
- ☐ C 140, 7, 5, 10
- ☐ D 140, 14, 5, 10
- ☐ E SyntaxError