Week 3 Workshop

Python Fundamentals, Data Structures, and Algorithms

Workshop Agenda

Activity	Estimated Duration
Welcome and check in	10 mins
Week 3 Review	75 mins
Break	15 mins
Workshop Assignment	2 hours
Code Review & Check-out	20 mins

Week 3 Review

Overview

Lists	For Loops
List Index	Strings
Bracket Notation	Dictionaries
Slicing Notation	Tuples
The In Keyword	Sets

Review: Lists

1. **["Charlie", "Alpha", "Delta", "Bravo"]**
2. **[]**
3. **[35, 57, 57, 211, 57, 232]**
4. **["nucamp", 0, 12.5, ‘Echo’]**

Discussion:

- Which of these is ***not*** a valid list?
- In the first list, what is the index of “**Delta**”?

Review: Bracket notation

- Used with all indexed Python data structures:

```
my_list = ["Charlie", "Alpha", "Delta", "Bravo"]
print(my_list[?])
```

- Discussion: To print "Charlie" to the terminal, what would you put inside the square brackets?

Review: Bracket notation

- You can also use bracket notation to modify list values

```
my_list = ["Charlie", "Alpha", "Delta", "Bravo"]
my_list[0] = "Echo"
print(my_list)
```

- Discussion: What is printed to the terminal by the code above?
  - ANSWER: ["Echo", "Alpha", "Delta", Bravo"]

Review: Using lists

```
my_list = ["Charlie", "Alpha", "Delta", "Bravo"]
```

Discussion:

- What is the return value of `len(my_list)`?
- What would happen if you type `my_list.append("Echo")`?
- What is the value of x when `x = my_list.pop()`?
- What is the value of x when `x = my_list.pop(2)`?

Review: Using lists

```
my_list = ["Charlie", "Alpha", "Delta", "Bravo"]
```

1. len(my_list)	Length is 4 (number of items)
2. my_list.append("Echo")	"Echo" added to end of list
3. x = my_list.pop()	"Echo" removed from list, x = "Echo"
4. x = my_list.pop(2)	"Delta" removed from list, x = "Delta"

Review: Slicing notation

my_list = ["Charlie", "Alpha", "Delta", "Bravo"]

Discussion: What part of the list is "sliced" by...

1. my_list[:3]

   ['Charlie', 'Alpha', 'Delta']

2. my_list[2:]

   ['Delta', 'Bravo']

3. my_list[1:3]

   ['Alpha', 'Delta']

Review: The in keyword

```
my_list = ["Charlie", "Alpha", "Delta", "Bravo"]
```

Discussion: What is the output of these?

1. `print("Alpha" in my_list)`

   True

2.
   ```
   if "Delta" not in my_list:
       print("No Delta")
   else:
       print("Delta")
   ```

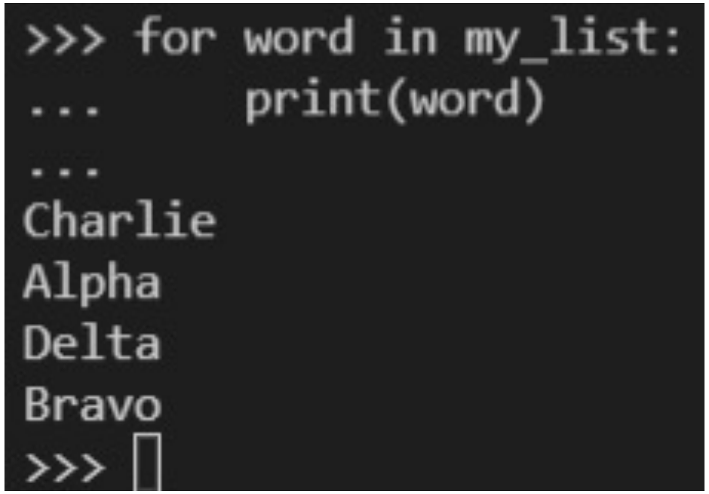
   “Delta”

3. `print("Echo" in my_list)`

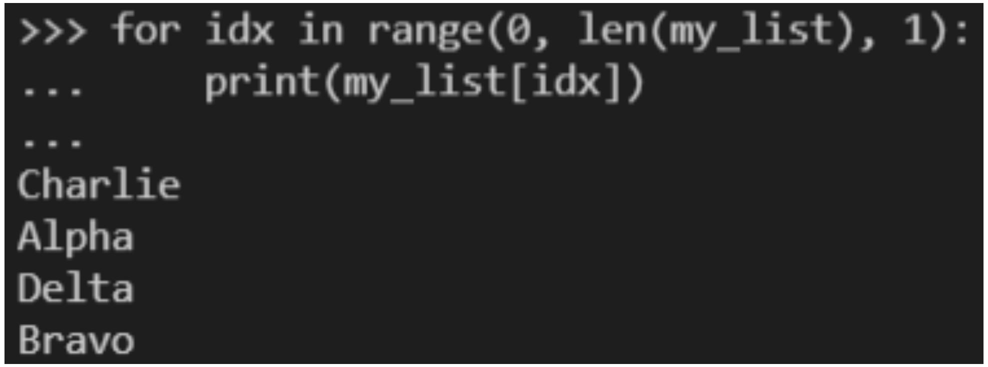
   False

Review: For loops

my_list = ["Charlie", "Alpha", "Delta", "Bravo"]



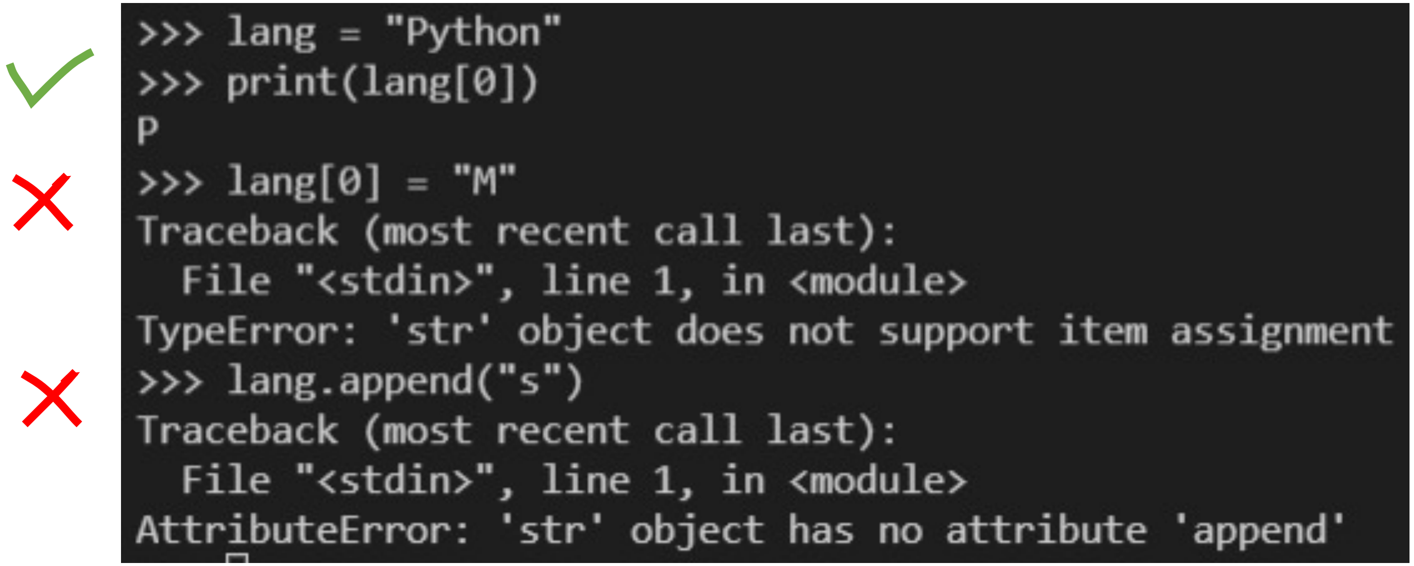
```
>>> for word in my_list:
...     print(word)
...
Charlie
Alpha
Delta
Bravo
>>> 
```



```
>>> for idx in range(0, len(my_list), 1):
...     print(my_list[idx])
...
Charlie
Alpha
Delta
Bravo
```

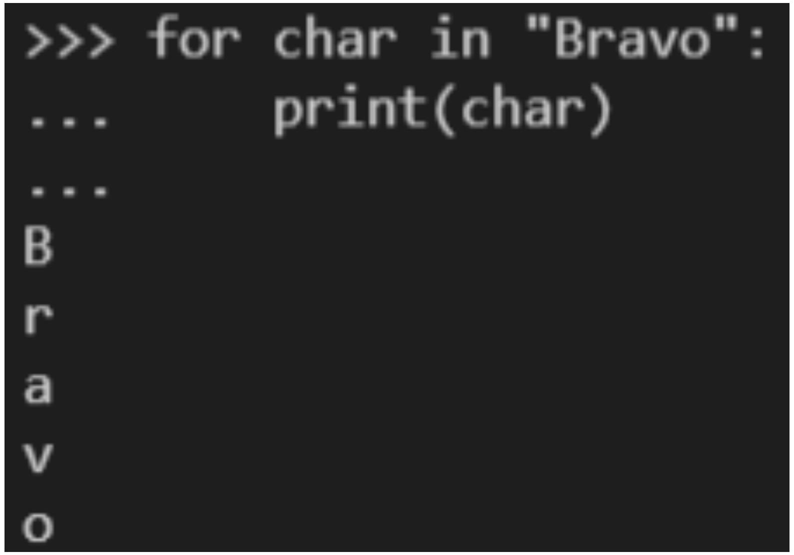
Review: Strings

- Only primitive data type also considered a data structure
- Contain ordered sequences of characters
  - Characters can be letters, punctuation, numbers, whitespace.
- Strings are immutable:



```
>>> lang = "Python"
>>> print(lang[0])
P
>>> lang[0] = "M"
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: 'str' object does not support item assignment
>>> lang.append("s")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
AttributeError: 'str' object has no attribute 'append'
```

Review: Strings



```
>>> for char in "Bravo":
...     print(char)
...
B
r
a
v
o
```

Review: Dictionaries

- Dictionaries contain key-value pairs
- Ordered sequence since Python 3.6, previous versions unordered
- Keys must be unique, values do not have to be
- Adding a duplicate key will overwrite existing key
- You can use bracket notation with the key to retrieve a value

Review: Dictionaries

```
ingredients = {"butter": "1 stick", "flour": "2 cups", "salt": "1 tsp"}
```

Discussion:

1. How would you retrieve the value associated with the key "**salt**"?

   ```
   ingredients["salt"]
   ```

2. How would you replace the value associated with the key "**flour**" with "**2.5 cups**"?

   ```
   ingredients["flour"] = "2.5 cups"
   ```

Review: Iterating Dictionaries

```
popcorn_prices = {"small": 1.5, "medium": 3.5, "large": 4}
```

Discussion: What would be the output from each statement?

1.
```
for size in popcorn_prices.keys():
    print(size)
```
```
small
medium
large
```

2.
```
for price in popcorn_prices.values():
    print(price)
```
```
1.5
3.5
4
```

3.
```
for size and price in popcorn_prices.items():
    print(size, price)
```
```
small 1.5
medium 3.5
large 4
```

Review: Tuples

- Tuples are immutable lists
- Immutable means cannot be changed
- **Discussion:**
  - Given the following tuple: tuple1 = (1, 10, 100, 1000)
  - Will either of these statements work without an error?
    1. tuple1[0] = 2 **NO**
    2. tuple1 = (2, 20, 200, 2000) **YES**

Review: Tuples

- Which of the following is *not* a valid way to declare a tuple?
    1. tuple1 = ("Charlie", "Alpha", "Delta", "Bravo")
    2. tuple2 = "Alpha", "Echo", "Bravo"
    3. tuple3 = ("Delta") ← Invalid
    4. tuple4 = ()

Review: Sets

- Unordered collection of values
- Duplicates are removed
- Sets are mutable but can only contain immutable data types

Discussion:

1. Which of Python's built-in data types can sets **not** contain?
2. Which is the correct way to create an empty set?
    a. my_set = {}
    b. my_set = set()

Review: Sets

Example: `my_set = {4, 23, 67, 1}`

- Use the method add() to add a new item to a set:
  ```
  my_set.add(55)
  ```
- Use the method discard() to remove an item from a set:
  ```
  my_set.discard(23)
  ```
- You cannot use bracket notation with sets as it is unordered and unindexed, has no keys nor indices
- To access values in a set, you can loop through it with a for loop, or test if specific values are present using the in keyword

Review: Sets

Example: my_set = {4, 23, 67, 1}

Discussion:

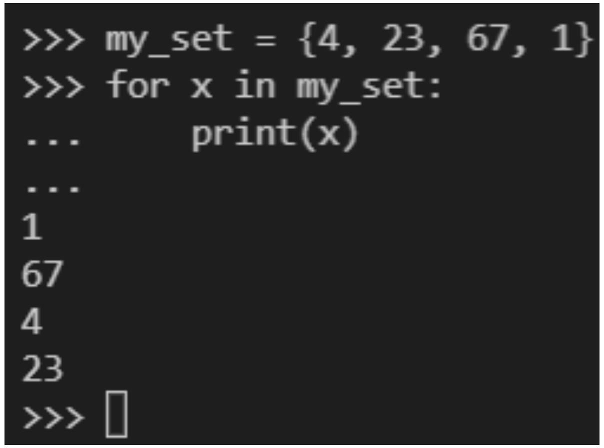
- What would be the result from the following code?

```
for x in my_set:
    print(x)
```

Review: Sets

Example: my_set = {4, 23, 67, 1}

```
for x in my_set:
    print(x)
```



```
>>> my_set = {4, 23, 67, 1}
>>> for x in my_set:
...     print(x)
...
1
67
4
23
>>> 
```

The answer is **not**

4

23

67

1

- Though there's a chance it could be, it's not guaranteed.
- The same 4 numbers will be printed, but the print order will not be the same as the order in which the set items were declared.
- The screenshot above is one potential order it could be in

Workshop 3 Assignment

Goal: Code a text-based donations website!

- **Tasks 1-2:** Set up files and folders, create homepage, initiate variables
- **Task 3:** Handle user input, add exit functionality
- **Tasks 4-7:** Add login, register, donations, and show_donations functionality.

- You will be split up into groups to work on the assignment together.
- Talk through each step out loud with each other, code collaboratively.
- If your team spends more than 10 minutes trying to solve one problem, ask your instructor for help!