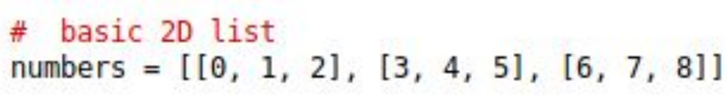
Lists and Tuples

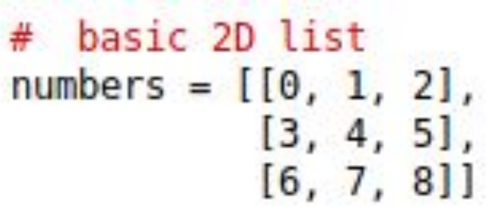
Fall 2019

2D Lists

- Lists inside of lists
- Make sure the square brackets line up appropriately



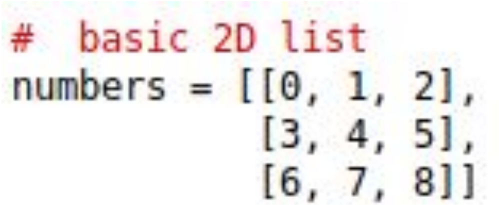
```
#  basic 2D list
numbers = [[0, 1, 2], [3, 4, 5], [6, 7, 8]]
```



```
#  basic 2D list
numbers = [[0, 1, 2],
           [3, 4, 5],
           [6, 7, 8]]
```

2D List Indexing

- To reference a specific item in a 2D list you need *two* sets of brackets
- One set of brackets would only get that sublist

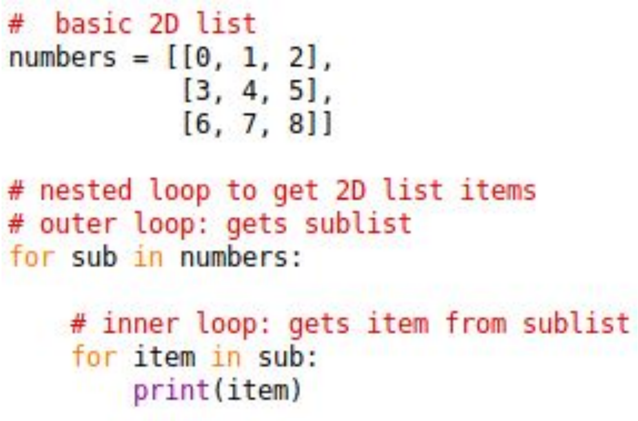


```
#  basic 2D list
numbers = [[0, 1, 2],
           [3, 4, 5],
           [6, 7, 8]]
```

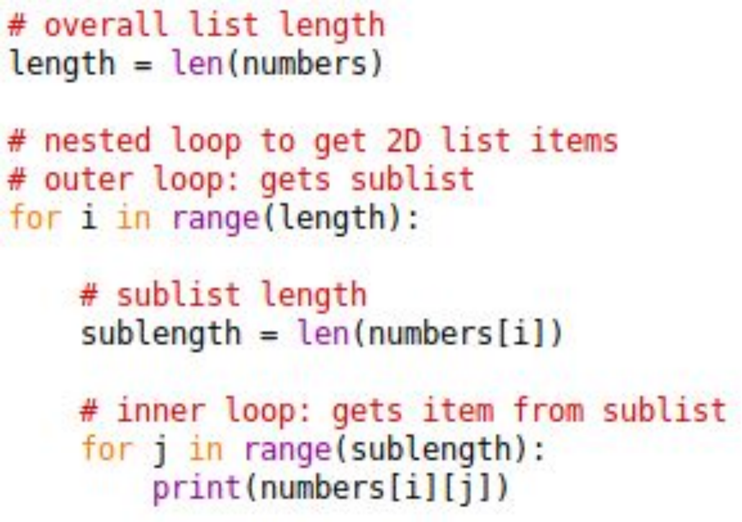
Index	Result
numbers[0]	[0, 1, 2]
numbers[1]	[3, 4, 5]
numbers[0][0]	0
numbers[1][0]	3
numbers[2][2]	8

Displaying 2D Lists

- Will need some sort of nested loop
- Will need an index/range loop to alter data



```python
#  basic 2D list
numbers = [[0, 1, 2],
           [3, 4, 5],
           [6, 7, 8]]

# nested loop to get 2D list items
# outer loop: gets sublist
for sub in numbers:

    # inner loop: gets item from sublist
    for item in sub:
        print(item)
```

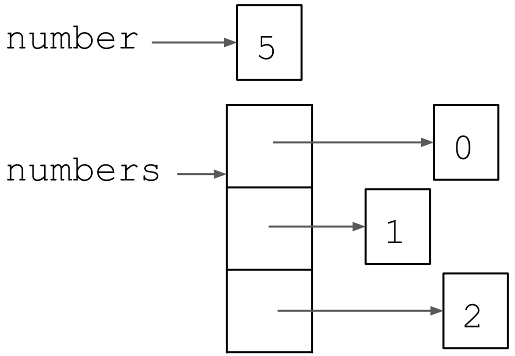


```python
# overall list length
length = len(numbers)

# nested loop to get 2D list items
# outer loop: gets sublist
for i in range(length):

    # sublist length
    sublength = len(numbers[i])

    # inner loop: gets item from sublist
    for j in range(sublength):
        print(numbers[i][j])
```

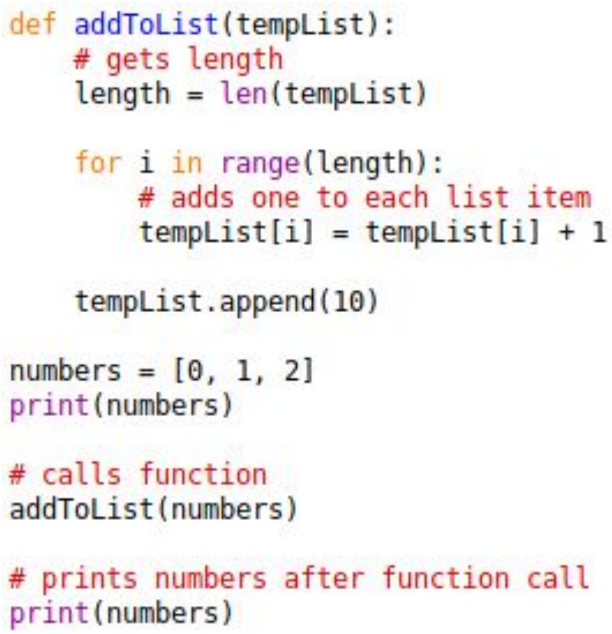
Lists in Functions

- If you want to use a list in an outside function, you do want to pass the list as an argument
- Unlike variables, if you alter the list in the function, you don't have to return the list
    - This is due to Python's memory model

```
number = 5
numbers = [0, 1, 2]
```

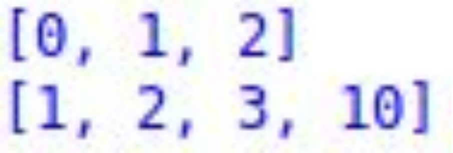


Lists in Functions



```
def addToList(tempList):
    # gets length
    length = len(tempList)

    for i in range(length):
        # adds one to each list item
        tempList[i] = tempList[i] + 1

    tempList.append(10)

numbers = [0, 1, 2]
print(numbers)

# calls function
addToList(numbers)

# prints numbers after function call
print(numbers)
```

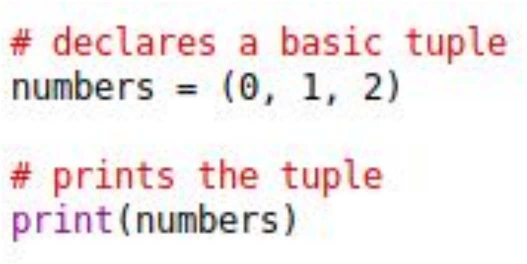
Output:



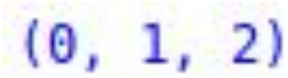
```
[0, 1, 2]
[1, 2, 3, 10]
```

Tuple

- A Python sequence
- Unlike lists, you can only view data and use it in some other context
  - Content cannot be changed, added to, or removed from
- Declared via parentheses



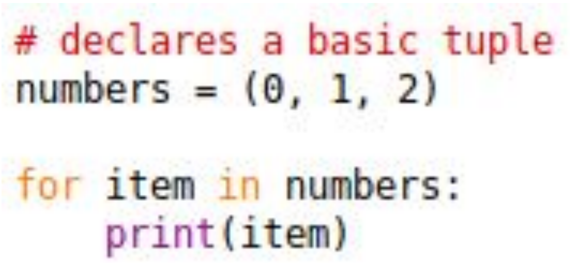
```
# declares a basic tuple
numbers = (0, 1, 2)

# prints the tuple
print(numbers)
```



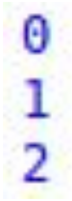
```
(0, 1, 2)
```

Displaying Tuples

- Only displayed via “for … in” loops
- Do not have indexing, nor does it have index loops as that would allow data to be altered



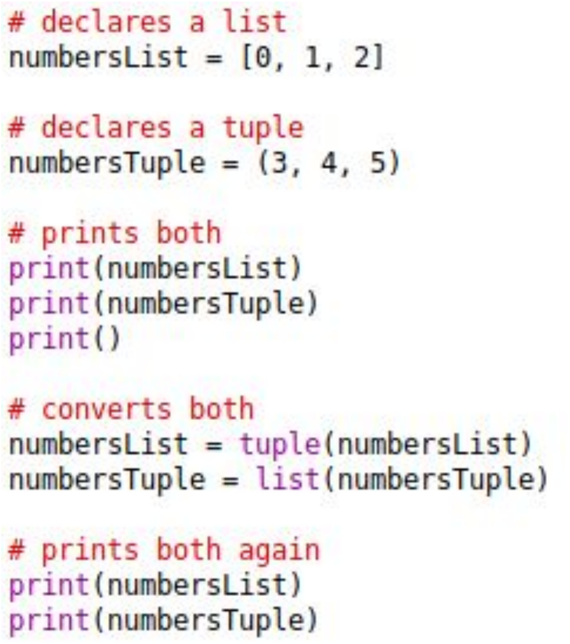
```
# declares a basic tuple
numbers = (0, 1, 2)

for item in numbers:
    print(item)
```



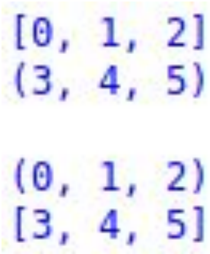
```
0
1
2
```

List/Tuple Conversion

- You can convert a list to a tuple and a tuple to a list
- Python has built-in functions to handle this



```
# declares a list
numbersList = [0, 1, 2]

# declares a tuple
numbersTuple = (3, 4, 5)

# prints both
print(numbersList)
print(numbersTuple)
print()

# converts both
numbersList = tuple(numbersList)
numbersTuple = list(numbersTuple)

# prints both again
print(numbersList)
print(numbersTuple)
```



```
[0, 1, 2]
(3, 4, 5)

(0, 1, 2)
[3, 4, 5]
```