

Lab 8 GRS

2D Lists, passing by reference, mutability

Housekeeping

- **Exam 2 next week** (Thursday during lecture)
 - Review sessions TBD next week Monday and Tuesday
- Project 2 design due Friday at 11:59

2D Lists

- Lists are a collection of elements
 - These elements can be **other lists**
 - Lists of strings are kinda like 2d lists
 - Lists are **mutable**

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]
```



Element 0
my_list[0]



Element 1
my_list[1]



Element 2
my_list[2]

2D Lists

- Printing contents of the 2d list my_list

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]
```

2D Lists

- Printing contents of the 2d list my_list

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
print(my_list[0])
```

```
[1, 2, 3]
```

2D Lists

- Printing contents of the 2d list my_list

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
print(my_list[0])  
print(my_list[1])
```

[1, 2, 3]
[4, 5, 6]

2D Lists

- Printing contents of the 2d list my_list

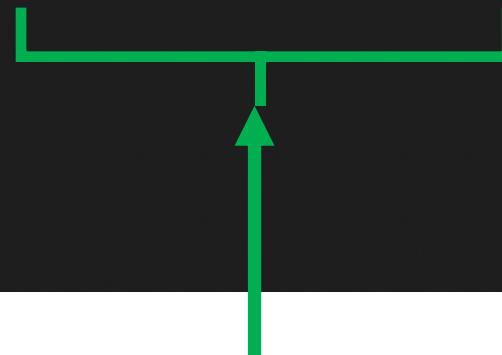
```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
print(my_list[0])  
print(my_list[1])  
print(my_list[2])
```

[1, 2, 3]
[4, 5, 6]
[7, 8, 9]

2D Lists

- Accessing an individual element

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
my_list[0]
```



An element

2D Lists

- Accessing an **element** of an element

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
my_list[0][0]
```

An element at the list

my_list[0]

Looping through 2D Lists

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]
```

Looping through 2D Lists

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
  
for row in range(len(my_list)):
```

Looping through 2D Lists

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
  
for row in range(len(my_list)):  
    for col in range(len(my_list[row])):
```

Looping through 2D Lists

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
  
for row in range(len(my_list)):  
    for col in range(len(my_list[row])):  
        print(my_list[row]  
            .  
            .  
            .)
```

Looping through 2D Lists

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
  
for row in range(len(my_list)):  
    for col in range(len(my_list[row])):  
        print(my_list[row][col], end = " ")  
    print()
```

Looping through 2D Lists

```
my_list = [[1,2,3], [4,5,6], [7,8,9]]  
  
for row in range(len(my_list)):  
    for col in range(len(my_list[row])):  
        print(my_list[row][col], end = " ")  
    print()
```

Lists are mutable

- **Lists are mutable**

Pass-by-reference

- Lists, dictionaries, and other mutable data types are **pass-by-reference**
 - The original variable (**not a copy**) is sent to the function
 - `list_1` and `list_2` will be modified
 - `x` is an *alias* (or pointer) of `list_2`
 - Be careful when using lists as parameters or returning them for this reason!

```
def do_something(list_1, list_2):  
    for i in range(10):  
        list_1.append(i)  
        list_2.append(i)  
    return list_2  
  
if __name__ == "__main__":  
  
    list_1 = []  
    list_2 = []  
  
    x = do_something(list1, list2)
```

Activity

- cp /afs/umbc.edu/users/a/g/agatha3/pub/201_grs/lab8/activity.py .
 - Don't forget the period