Recitation 4 Notes:

Reminders:

- **No class on Monday**
- **No MQ next week**
- **PS2 half way hand in due next Wednesday**

Lecture 8: Functions and Scope

Functions

- Functions capture computation within a black box.
- We use them to reuse code and write programs in a more concise way.
- They take in Inputs and return outputs.
- We call the inputs parameters.
- Outputs are outputted using the return statement.

Defining a function:

```
def count_letter_e(my_word):
    count = 0
    for letter in my_word:
        if letter == "e":
            count += 1
    return count
```

Calling a function:

```
print(count_letter_e("hello, this is a test")
```

Print vs return

- **print:** for the user, just displays a value
- **return**: for the computer and allows you to send values in a function back to other parts of your code. Python's default return in None and nothing is executed after the return statement.

Scope

- Variable assignments are tracked in a **symbol table** or **stack frame** that maps variable names to their values
- When a function is **called**, a new stack frame is created.
- When the function returns, the stack frame pops off/is destroyed
- My python tutor does a good visualization of this https://pythontutor.com/.

Functions as a Parameter

Example:

```
def calc(op, x, y):
        return op(x, y)

def add(a, b):
        return a+b

def div(a, b):
        if b != 0:
                return a/b
        print("Denominator was 0.")

print(calc(add, 2, 3))
```

Lecture 9 – Lambda Functions, Intro to Tuples & Lists

A few additional notes on functions:

- They have their own type
- Can be passed in as arguments to other functions
- They can be returned as a value from another procedure

Lambda Functions

- Anonymous way of writing functions that are not bound to a specific name
  E.g.

```
y = lambda x: x + 5
print(y(4))  # this prints 9 to the console
```

Tuples

- Ordered sequences of objects.
- Syntax: my_tuple = (1, 2, "test", 4, "hello")
- Objects can be of any type.
- They are immutable – i.e. cannot be changed once created.

Lists

- Ordered sequence of objects.
- Syntax: my_list = [1, 2, "test", 4, "hello"]
- Objects can be of any type.
- They are mutable – i.e. they can be changed once created.

Common operations on lists and tuples:

- **Indexing**

```
my_list = [1, 2, “test”, 4, “hello]
print(my_list[0])  # this prints 1

# similarly
my_tuple = (1, 2, “test”, 4)
print(my_tuple[2])  # this prints test
```

- **Slicing**

```
my_list = [1, 2, “test”, 4, “hello]
print(my_list[0:2])  # this prints [1,2]

my_tuple = (1, 2, “test”, 4)
print(my_tuple[2:]). # this prints (“test”, 4)
```

- **Looping over elements –** we can write similar code for both tuples and lists.

```
my_list = [1, 2, “test”, 4, “hello]

# this for loop loops through each element of my_list and
outputs to console
for elem in my_list:
   print(elem)
```