

## Discussion 16: Conclusion, Final Review

### Object-Oriented Programming

We want to write objects that simulate grading in CS10. Fill in the function definitions below to complete our implementation!

```
import random

class Reader:
    # Every reader has a name and a list of assignment objects they need #
    # to grade. The list of assignments should start out empty.
    def __init__(self, name):

        def grade_assignment(self):
            # Assign a random score to the first item in the grading queue
            # and then remove that assignment from the queue

            score = random.randint(0, 10)

class Assignment:
    # Every assignment has a student object, assignment title, and score.
    # The score should always start out as 0.
    def __init__(self, student, title):

class Student:
    # Every student has a name
    def __init__(self, name):

        def submit(self, assignment, reader):
            # To submit an assignment, add the assignment object to the
            # reader's grading queue
```

## Recursion

1. Write a recursive function that takes in a number,  $n$ , and determines how many digits it has. Hint: One way to figure out how many digits are in a number is to count how many times you need to divide that number until you get a number less than 10.

```
def num_digits(n):
```

2. Write a function called `value` that takes in a (possibly nested) dictionary and a key in that dictionary, and returns the value of that key.

```
>>> dict = {'name': 'Pikachu', 'attack': {'move': 'Thunder Shock',  
'damage': 40}, 'type': 'electric'}  
>>> value(dict, 'damage')  
40
```

```
def value(dict, key):
```

3. You need to buy exactly `total` pieces of candy, but the grocery stores around you only sell candy in packs of  $x$  and  $y$ . Fill out the recursive function `buy_candy` to determine whether you'll be able to successfully buy your candy.

```
>>> buy_candy(100, 25, 40)  
True #25(4) + 0(40) = 100  
>>> buy_candy(33, 9, 12)  
True #9(1) + 12(2) = 33  
>>> buy_candy(10, 4, 8)  
False
```

```
def buy_candy(total, x, y):
```