

## Computer Science 134C

*Introduction to Computer Science, in Python*

Lecture #3 (Code reuse with scripts and functions)

September 12, 2018

### Keywords

argv, condition, function, maximum, method, reuse, parameters, script, syr

We organize computations to be reused.

1. Questions?
2. Converting feet and inches to centimeters and back.
3. A script, `dow.py`, to compute the day of the week according to the algorithm in Monday's notes:

```
# A script to compute the day of the week.
# (c) 2018 duane a. bailey
month = int(input("Month (1-12): "))
day = int(input("Day (1-31): "))
year = int(input("Year (1900-2099): "))

# this is a *list* containing 12 integers.
adjustments = [ 1,4,4, 0,2,5, 0,3,6, 1,4,6 ]

# the integers in the adjustment list are indexed 0 through 11
# madj is the adjustment based on the particular month
madj = adjustments[month-1]

# it's best to think of the year as a value between 0 and 200
year -= 1900

# this is the main calculation:
sum = madj + day + (year//4) + year

# this is a correction for early in leap years
if (year%4 == 0) and (month <= 2) :
    sum -= 1

# a *list of strings*, indexed between 0 and 6 (remainders, mod 7)
dayName = ["Saturday", "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday"]
print(dayName[sum%7])
```

Recall: to *execute* this script, we can type:

```
python3 dow.py
```

We can now *reuse* the code in the script, without re-typing the commands.

4. Functions (sometimes *procedures* or *subroutines*). Introduced with the keyword `def`.
- (a) We use functions to gather together subordinate *suites* of statements that perform (at some level) a single, logical action. Some functions produce results. Others produce side-effects. This encapsulation allows us, again, to *reuse* computations whenever we wish.
  - (b) Functions are *parameterized* by *arguments*. For example, the trigonometry `math.sin` function takes an angle. The `print` takes an object. Within the function definition, expressions refer to arguments as *formal parameters*. When we call the function, the values we *actually* use are called *actual parameters*.
  - (c) Example: A function to detect odd integers. How about even integers?
  
  - (d) Example: A simple, but strange function, `syr`.
  
  - (e) Example: Printing the orbit of `syr`, `porb`.
  
  - (f) Example: Measuring the length of the orbit of `syr`, `morb`.
  
  - (g) Example application: Finding long orbits.