Programming review

DS110, Fall 2022

also download the Kahoot! app for your phone!

~Open a new Colab notebook before we begin~

Tell me something about...

- lists

- square brackets
- store values
- first index is 0
- elements may have different types
- iterate through items with for loop
- items can be repeated
- can use map / filter on it

Tell me something about...

- lists
- functions

- set of instrs, that can be reused
- should return something
- can use functions within functions
- helps modularity of programs
- uses local variables
- arguments specify inputs to function and are local variables themselves

Tell me something about...

- lists
- functions
- dictionaries

- follow key/value format instead of indices
- accessing a dictionary is much faster than searching a list
- could store lookup values for strings
- treat as unordered

Tell me something about...

- lists
- functions
- dictionaries
- DataFrames

- can create from .csv or .tsv files
- can create dataframes that match an original but are filtered
- 2D and the 1D is a Series
- can mix data types in the table
- use &, |, ~ for combining Boolean DFs

Tell me something about...

- lists
- functions
- dictionaries
- DataFrames
- good code style

- proper spacing - good spacing on tabs
- good variable names - match style of naming, describes its data
- comment large blocks of code, especially functions
- avoid repeated code - use functions instead
- use existing modules when possible

Spot the bug

- What is wrong with this code? How do we fix it?

```
mylist = ['A', 'B', '1']

def contains_number(mylist):
  for item in mylist:
    if item.isdigit():
      return True # number found
    else:
      return False
```

Reading code with map and lambda

- What does the following code do, without running it?
- Can you rewrite it as a list comprehension?

```
list(map(lambda s: s.lower(), mylist))
```

[s.lower() for s in mylist]

Process

- check rest of notebook for names that might collide, etc
- How do you write code?
  - sketch ideas
  - break it down
  - write in pseudocode first
  - try out some small code in a window
  - In what order do you write and run the code?
  - How do you debug?
    - look at the error message
    - walk through logic step-by-step
    - print the intermediate values in the code
    - figure out what the return value should be
    - try out examples that exercise different conditionals
- scale back to a simpler function and get it to work
- figure out if it's syntax or logical, and where bug is
- Comment out sections to track bug down

Iteration and numpy

- Fill an 11 x 11 array with the multiplication table for 0 through 10, so for example table[2][3] = 6. Print the table. (Hint: you can initialize the table with np.zeros().)

Dictionaries and strings

- Write a function animalhasher() that
  - Takes a single comma-separated string as input (“panda,lion,bear,bear”)
  - Creates a dictionary that stores how often each string appears in the sequence
  - For every value over 1, creates a “plural” key with “s” appended that returns the same value (“bears”: 2)
  - Returns this dictionary

Functions and lists (and sets?)

- Write a function unique() that returns True if every element in its list argument is unique - no duplicates. (Otherwise, it returns False.)