CIS 122

Homework Review

Assignment 1

- Part 0 - Stringing Things Together
- Part 1 - Is it Cold in Here?
- Part 2 - Taking it to the Max
- Part 3 - A Shifty Problem (part one)

Assignment 1 - Part 0

- You are given three strings:
  - a = "ARMADILLO"
  - b = "BUTTERFLY"
  - c = "CHAMELEON"
- Your task is to produce different strings
  - Use string manipulation techniques
  - Store results to variables
- For example, to produce the string "MADMADMELON"
  - string0 = a[2:5] * 2 + c[3:6] + c[7:]

Assignment 1 - Part 0

- You are given three strings:
  - a = "ARMADILLO"
  - b = "BUTTERFLY"
  - c = "CHAMELEON"
- Could select each character individually
  - a[3] + a[4] + a[5] + a[2] + ...
  - This is tedious
- As a challenge, find creative string productions
  - I'll share the most interesting ones

Assignment 1 - Part 1

- Write 3 temperature conversion functions
  - FtoC (Fahrenheit to Celsius)
  - CtoK (Celsius to Kelvin)
  - FtoK (Fahrenheit to Kelvin)

- You are given formulas
  - Tc = (5/9) (Tf - 32)
  - Tk = Tc +273

- No formula converting from Farenheit to Kelvin
  - Don't compute it yourself!
  - Let Python do your work for you

Assignment 1 Part 2

- Write 3 functions:
- myMax(a,b) returns largest of a and b
  - Conditional logic
- myMax3(a,b,c) returns largest of a, b, and c
- myMax5(a,b,c,d,e) returns largest of a, b, c, d, and e

Assignment 1 - Part 2

```
def myMax5(a,b,c,d,e):
    if a > b:
        if a > c:
            if a > d:
                if a > e:
                    return a
                else:
                    return e
            if d > e:
                return d
            else:
                return 3
```

augh!

Assignment 1 - Part 2

```
def myMax5(a,b,c,d,e):
    f = myMax3(a,b,c)
```

Reduce your problem to ones you've already solved

Assignment 1 - Part 3

- Cryptosystems
  - Used for sending secret messages
  - Sender enciphers message into ciphertext
  - Receiver deciphers message recovering plaintext

- Caesar Cipher
  - A system for sending secret messages
  - Enciphering:
    - shift each character forward the same distance
  - Deciphering:
    - shift each character back the same distance

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DEFGHIJKLMNOPQRSTUVWXYZABC

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DEFGHIJKLMNOPQRSTUVWXYZABC

A → D

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

A**B**CDEFGHIJKLMNOPQRSTUVWXYZ
D**E**FGHIJKLMNOPQRSTUVWXYZABC

A → D
B → E

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DEFGHIJKLMNOPQRSTUVWXYZABC

A → D
B → E
C → F

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DEFGHIJKLMNOPQRSTUVWXYZABC

- Use single character shifts to encode message

ATTACK AT DAWN

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DEFGHIJKLMNOPQRSTUVWXYZABC

- Use single character shifts to encode message

ATTACK AT DAWN
D

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRS**T**UVWXYZ
DEFGHIJKLMNOPQRSTUV**W**XYZABC

- Use single character shifts to encode message

ATTACK AT DAWN
DW

Assignment 1 - Part 3

- Suppose we want to shift 3 spaces forward
  - With paper and pencil...

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DEFGHIJKLMNOPQRSTUVWXYZABC

- Use single character shifts to encode message

ATTACK AT DAWN
DWWDFN DW GDZQ

Assignment 1 - Part 3

- How would we approach this problem programmatically?

- Break it down into simpler pieces
  - How do we shift a single character?
  - Given the ability to shift a single character, how do we shift an entire string?

- We'll tackle the first question this week
  - Stay tuned for part two...

Assignment 1 - Part 3

- Your task is to write a character shifter
  - Takes character and number as input
  - Return character shifted forward by number
  - Non-alphabetic characters should return unchanged

```
>>> caesarShift('A', 3)
'D'

>>> caesarShift('z', 7)
'g'

>>> caesarShift('7', 3)
'7'
```

Assignment 1 - Part 3

- But how do we shift a character?
  - Characters are strings
  - String addition just merges strings together
  - If only we could work with numbers...

Assignment 1 - Part 3

- Under the surface, strings are just numbers!
  - ord function converts a character to a number
  - chr function converts a number to a character
- A few useful encodings:
  - 'A' = 65, 'B' = 66, ..., 'Y' = 89, 'Z' = 90
  - 'a' = 97, 'b' = 98, ..., 'y' = 121, 'z' = 122
- Given some character **c** with encoding **n**
  - What can we determine about **c**?
  - What character comes right after **c**?

Assignment 1 - Part 3

- You may assume that the 0 <= shiftNum <= 25
  - But you don't have to
  - Feel free to handle very large shifts
  - May find the % operator useful...

Assignment 1 - Part 3

- The rest is up to you
- Try to figure this out on your own
- If you get stumped, I include a more detailed breakdown
  - White text
  - Highlight to read it

Assignment 1 - Notes

- Avoid excessive nesting
- Don't forget your docstrings
- Don't forget to comment your code