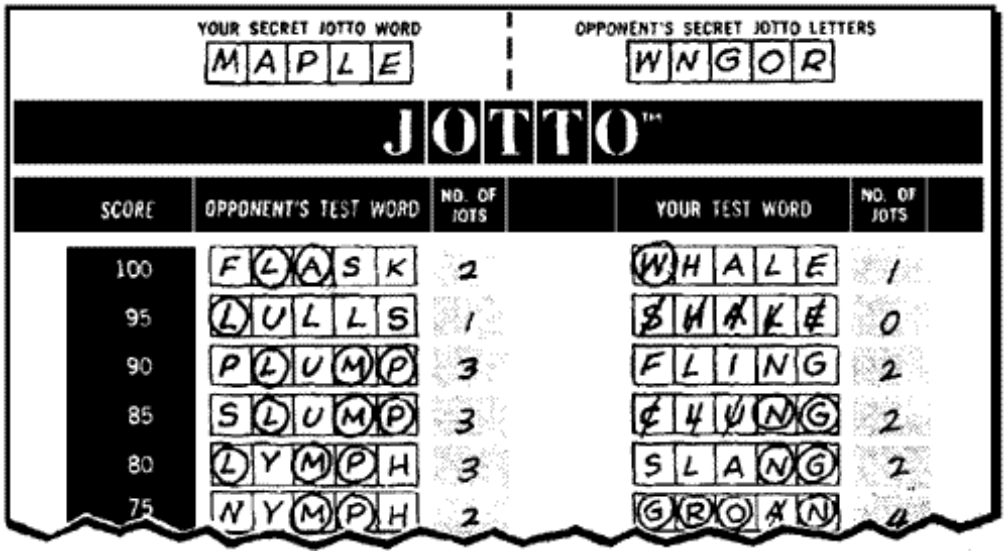
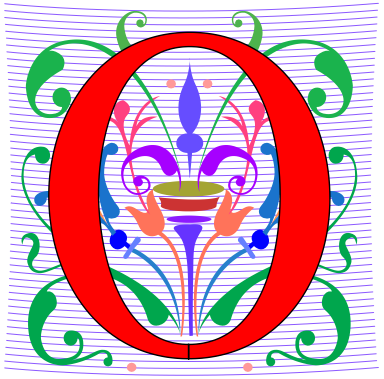
Compsci 101
Problem Solving



Susan Rodger

March 9, 2023

O is for …



- **Open Source**
  - Copyright meets the Creative Commons
- **Object Oriented**
  - Using classes and more in programming
- **Occam's Razor**
  - Not just compsci. Simple is good

The Tech Twins

- **Troy and Travis Nunnally**
- **Between them: 2 master's and 1 doctorate from Georgia Tech**
- **Cofounders of Brain Rain Solutions**
  - Augmented-reality
  - Internet-of-things
- **Applied machine learning**

Troy: "My advice would be to stay consistent. Always think persistently and consistently about learning a particular craft."

Travis: "I think that you have to be passionate and find something that you simply love and enjoy. Not only find that thing — but actually be a lifelong learner around that."

https://www.wired.com/story/what-atlanta-can-teach-tech-about-cultivating-black-talent/

Announcements

- **Assign 4 GuessWord due Thursday, March 23**
  - Sakai Assignment Quiz due **TUESDAY, March 21**
- **APT-5 and Assign 5 out, March 23**
  - Will talk about next Thursday
- **No Lab Friday!**
- **APT Quiz 2 on March 30-Apr 3**

PFTD

- **Problem Solving**
- **Jotto game**

Problem Solving – What to use

- **Do you need to loop over anything?**
  - Do you need the index of the item?
- **Do you need to make a decision?**
- **Do you need unique elements?**
- **Are you working with two groups of things?**
  - Are they parallel lists?
  - Are you comparing elements in some way with two groups of elements

Now let's look at an APT from APT-5

Sandwich Bar

APT: SandwichBar Search

Problem Statement

It's time to get something to eat and I've come across a sandwich bar. Like most people, I prefer certain types of sandwiches. In fact, I keep a list of the types of sandwiches I like.

The sandwich bar has certain ingredients available. I will list the types of sandwiches I like in order of preference and buy the first sandwich the bar can make for me. In order for the bar to make a sandwich for me, it must include all of the ingredients I desire.

Class

```
filename: SandwichBar.py

def whichOrder(available, orders):
    """
    return zero-based index of first
    sandwich in orders, list of strings
    that can be made from ingredients
    in available, list of strings
    """

    # you write code here
```

Given `available`, a list of Strings/ingredients the sandwich bar can use, and a `orders`, a list of Strings that represent the types of sandwiches I like, in order of preference (most preferred first), return the 0-based index of the sandwich I will buy. Each element of `orders` represents one type of sandwich I like as a space-separated list of ingredients in the sandwich. If the bar can make no sandwiches I like, return -1.

Sandwich Bar Example

- available = ["cheese", "cheese", "cheese", "tomato"]
- orders = ["ham ham ham", "water", "pork", "bread", "cheese tomato cheese", "beef"]

Sandwich Bar Example

- available = ["cheese", "cheese", "cheese", "tomato"]
- orders = ["ham ham ham", "water", "pork", "bread", "cheese tomato cheese", "beef"]

- Returns 4
- Can make “cheese tomato cheese”

- Ignore any duplicates!

WOTO-1 SandwichBar
http://bit.ly/101s23-0309-1

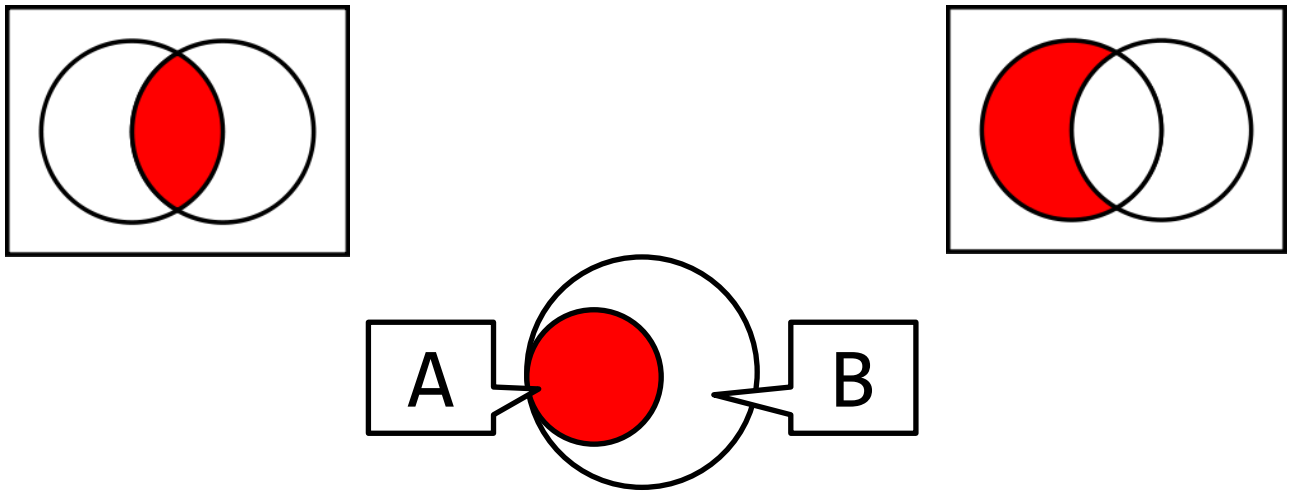
Given two lists A and B

- **Determine if all elements in A are also in B**
  - Examine each element in A
    - If not in B? False
  - After examining all elements? True

- **Think: Could we use sets instead?**

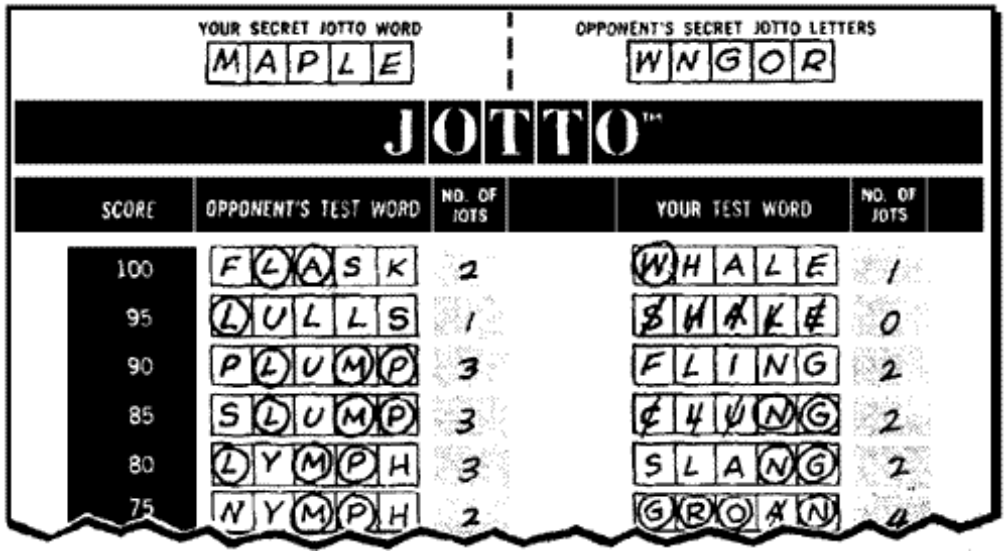
Given two sets A and B

- **Determine if all elements in A are also in B**
  - `if len(A & B) == len(A)`
  - `if len(A - B) == 0`



Jotto: Game similar to GuessWord

- https://en.wikipedia.org/wiki/Jotto
- http://jotto.augiehill.com/single.jsp
- **No letters repeat – have to agree on this**
- **Shall we play a game?**



Write program where Computer Guesses Your Word

- **You give the computer a word to guess, called wordToGuess**
- **Computer does brute force, no thinking or eliminating letters**
  - It picks a word at random
  - Calculates how many letters in common with wordToGuess, say x letters
  - Only keep words with x letters in common
  - Repeats until guesses the word

We will build useful functions to use to build the game

WOTO-2 Approaching Implementation http://bit.ly/101s23-0309-2

- **What is needed?**
- **What order should the code do things?**

SimpleJotto.py

- **We have a file of five letter words: `kwords5.txt`**
  - Would you like to play a game?

- **Let's start! Simple version that sort of works ☺**

WOTO-3 Jotto Two Functions
http://bit.ly/101s23-0309-3

Think about how to put the game together with all these pieces