

Plan for TDAFB (after fall break)

- Hear via email about plans to catch-up and stay-ahead
 - Profs. Rodger and Astrachan to supply info
- Review APTs due next week
 - Ideas, Code, Algorithms, approaches
 - Review loops and structures
 - How sets can be useful
- Word games to start things off
 - Assignment coming

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Succeeding with APTs in Compsci 101

- First do example, solve problem by hand, then Python
 - Capable of doing all examples by hand for APT
 - You don't want to have to do *all* of them by hand!
- Using built-in functions:
 - `len(x)`, `sorted(x)`, `max(x)`, `''.join([...])`
 - What is return type of each, which is "it depends"
- Two loops (index/element), Three structures
 - String, list, and now set

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Computational Jumble

<http://www.jumble.com>

Use this problem to think about word games

- Human approach
 - What do you do?
- Computational method?
 - Cheating or insight?

JUMBLE THAT SCRAMBLED WORD GAME
by Mike Argiron and Jeff Knourek

Unscramble these four jumbles, one letter to each square, to form four ordinary words.


SCAMK
CARPH
TECTAL
SLIRGY

Now arrange the circled letters to form the surprise answer, as suggested by the above cartoon.

Print your answer here:

(Answers tomorrow)

Yesterday's Jumbles: SKUNK TWEAK GAMBOL ADJOIN
Answer: The plastic surgeon sought the clerk's help because she had a — "KNOWS" JOB



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Eros by any other name would be sore

- See Jumble.py (accessible via snarf)
 - Find standard or canonical form for jumbled
 - "aeprs" is ... in alphabetical order!
 - `sorted('spear')` and `sorted([3,1,2,8])`
- Review of list comprehensions,
 - Given a large list of strings named words, what does this comprehension do?

```
[w for w in words if len(w) == len('rose')]
```

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How long does this take in Jumble.py?

```
[w for w in words if sorted(w) == sorted(jword)]
```

- Go through each of 354,984 words and ...
 - Sort the word, which returns a list
 - Compare to sorted form of each word
- What if we change boolean filter?
 - Why does this appear to make a difference?

```
if len(w) == len(jw) and sorted(w) == sorted(jw)
```

Jumble programming concepts

- When you run the program it starts in main
 - This is how Python works, boilerplate code
- What's the variable words at beginning?
 - Global variable. Accessible in every function in the Python module
 - Used sparingly can be useful in a small module
 - Abused, can lead to hard to maintain code

Answer Questions

<http://bit.ly/101fall15-oct15-1>

After questions, solving APTs:
ideas and hints for making
progress

ColorfulTiles: Ideas, Algorithm, Code

<http://www.cs.duke.edu/csed/pythonapt/colorfultiles.html>

- "RGGBBBRYB" has solution 3, why?



- Indexing can help. Changing a cell's color?
 - What about tile at $i-1$ and at $i+1$ (from i)
 - Change cell 2? Change 3, 4, 5?

Two structures, two types of loop

● Loop by index or by element?

- What do we do with each element, how to compare to element before? Or After?
- Can do with either loop, much simpler with indexing loop!



Two structures, two types of a loop

● What structure to use: string or list?

- After examining each element, operations?
- At green, with green to left, change me to ____ ?
 - Use list to mark with '*', advantage of four colors!
 - Remember strings are immutable



Solving UniqueNames APT

Bodhi Xerxes
Penelope Cayenne

Approach to solving APT

- Loop over classes, find name/year, repeat
 - Indexing loop? name/year, name/year, ...
 - Use range(x,y,2) for accessing every other entry
- Add all student names to a list or a set
 - How to make list contain no duplicates? Set
 - How to sort all the names? Sorted
- Combine ideas, and done!

Coding aspects, not algorithmic

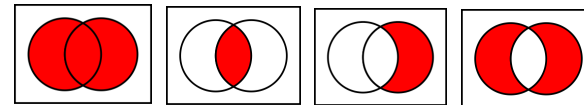
- Given list of names...stored in taken ...
- Add a name to list or set, differences?
 - `taken.append(name)` or `taken.add(name)`
- Create a list of just the unique names?
 - `uniq = list(set(taken))`
- Create a sorted version of taken?
 - `st = sorted(taken)` -- list, string, or set?
- Create space-separated string with values?
 - `' '.join(joinable)` what type is joinable?

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Challenge APT UniqueZoo

- Using sets and set operations can help
 - Set intersection and set union
 - Other set operations
- $A \cup B$, set union, $A \cap B$, set intersection
- $B - A$, set difference, $B \Delta A$, symmetric diff



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Nested Loops: FortunateNumbers

- How to loop over all characters in each string of a list, e.g., to count all occurrences?
 - Looping over string in loop over list...
 - Think only about inner loop first, ...
- Often useful to put inner loop in another function! Did this in Caesar.py

```
for x in ['apple', 'pear', 'orange']:
    for ch in x:
        print ch
        values[alpha.index(ch)] += 1
```

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Create "couples" from two lists A, B

- A name is fixed as the inner loop executes
 - See output to reinforce this idea

```
A = ['sam', 'lou', 'chris']
B = ['terry', 'brook', 'val']
for aname in A:
    for bname in B:
        print aname, ",", bname
```

```
sam , terry
sam , brook
sam , val
lou , terry
lou , brook
lou , val
chris , terry
chris , brook
chris , val
```

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Answer Questions

<http://bit.ly/101fall15-oct15-2>

Sets are unique and fast!

- Consider importance of `-- if x in Y`:
 - How long does it take to find x in Y ?
 - What does it depend on? See `Timings.py`
- How can we find if a book is in library?
 - Assume all books shelved properly, then ...
 - If we can't assume that, what do we do?
- Look up in set doesn't depend on set size!
 - Cannot add list to set or set to set or ...