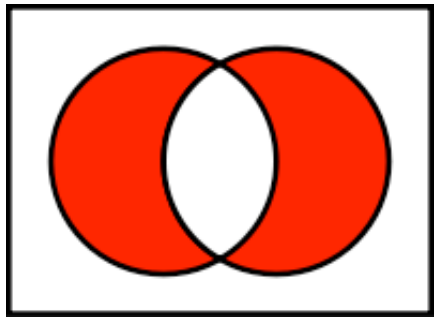
CompSci 101
Introduction to Computer Science



October 9, 2014

Prof. Rodger

Thanks to Prof. Azhar and Yossra Hamid for giving this lecture!

Announcements

- Reading for next time on calendar page
  - en.wikibooks.org/wiki/Python_Programming/Sets
  - RQ
- APT 4 is due today
  - APT 5 is out today
- Exam 1 was handed out Tuesday, grades are on Sakai, you will need to see Prof. Rodger next week to get your test back
- Today Sets
- Prof. Rodger is at a conference this week
  - http://gracehopper.org/

Python Sets

- Set – unordered collection of distinct items
  - Unordered – can look at them one at a time, but cannot count on any order
  - Distinct - one copy of each
- Operations on sets:
  - Modify: add, clear, remove
  - Create a new set: difference(-), intersection(&), union (|), symmetric_difference(^)
  - Boolean: issubset <=, issuperset >=
- Can convert list to set, set to list

Summary (from wikibooks)

```
set1 = set()                    # A new empty set
set1.add("cat")                 # Add a single member
set1.update(["dog", "mouse"])   # Add several members
set1.remove("cat")              # Remove a member - error if not there
print set1
for item in set1:               # Iteration AKA for each element
  print item
print "Item count:", len(set1)  # Length AKA size AKA item count
isempty = len(set1) == 0        # Test for emptiness
set1 = set(["cat", "dog"])      # Initialize set from a list
set3 = set1 & set2              # Intersection
set4 = set1 | set2              # Union
set5 = set1 - set3              # Set difference
set6 = set1 ^ set2              # Symmetric difference (elements in either
set but not both)
issubset = set1 <= set2         # Subset test
issuperset = set1 >= set2       # Superset test
set7 = set1.copy()              # A shallow copy (copies the set, not the
elements)
set8.clear()                    # Clear AKA empty AKA erase
```

Creating and changing a set

```
colorList = ['red', 'blue', 'red', 'red', 'green']
colorSet = set(colorList)
smallList = list(colorSet)
colorSet.clear()
colorSet.add("yellow")
colorSet.add("red")
colorSet.add("blue")
colorSet.add("yellow")
colorSet.add("purple")
colorSet.remove("yellow")
```

- See setsEasy.py

Set Operations

```
UScolors = set(["red", "white", "blue"])
dukeColors = set(["blue", "white"])
print dukeColors.union(UScolors)
print dukeColors | UScolors
print dukeColors.intersection(UScolors)
print dukeColors & UScolors
print dukeColors.difference(UScolors)
print dukeColors - UScolors
print UScolors - dukeColors
print dukeColors ^ UScolors
print UScolors ^ dukeColors
```

- See setsEasy.py

Set Examples
bit.ly/101fall14-1009-01

```
poloClub = set(['Mary', 'Laura', 'Dell'])
rugbyClub = set(['Fred', 'Sue', 'Mary'])
Question 1:
print [w for w in poloClub.intersection(rugbyClub)]
Question 2:
print [w for w in poloClub.union(rugbyClub)]
```

More Set Examples
bit.ly/101fall14-1009-02

```
lista = ['apple', 'pear', 'fig', 'orange', 'strawberry']
listb = ['pear', 'lemon', 'grapefruit', 'orange']
listc = [x for x in lista if x in listb]
listd = list(set(lista)|set(listb))
```

Question 1:

```
print listc
```

Question 2:

```
print listd
```

More Set Examples

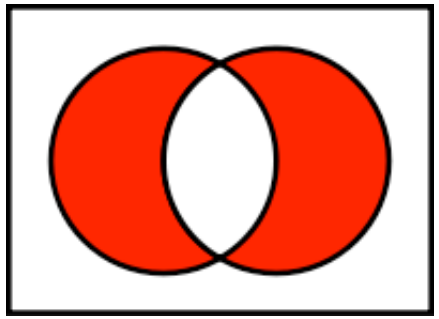
```
s = set(lista)
t = set(listb)
problem1 = (s-t) | (t-s)
print problem1
problem2 = (s|t) - (s&t)
print problem2
problem3 = (s|t|(s&t))
print problem3
```

```
lista = ['apple', 'pear', 'fig', 'orange', 'strawberry']
listb = ['pear', 'lemon', 'grapefruit', 'orange']
```

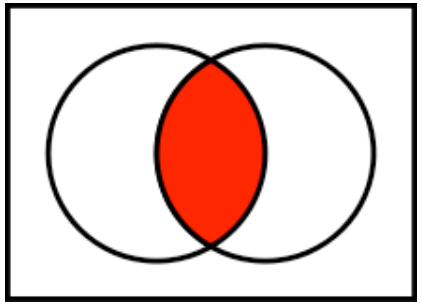
Set Operations from pictures
bit.ly/101fall14-1009-03

Question: Which picture is which operation?

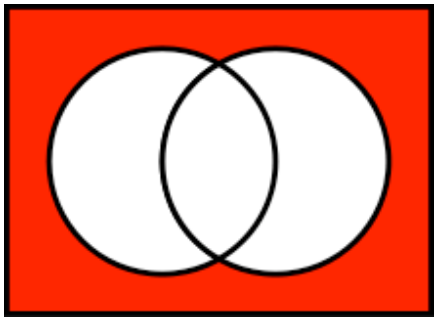
A)



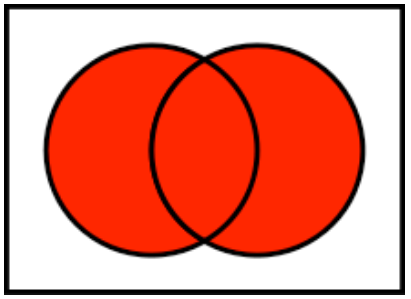
B)



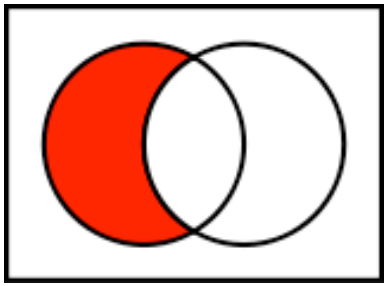
C)



D)



E)



Problems – snarf setExample.py

- Given a list of strings that have the name of a course (one word), followed by last names of people in the course:
  - Convert list into lists of strings of names for each course
  - Find total number of people taking any course
  - Find number of people taking just one course

["econ101 Abroms Curtson Williams Smith", "history230 Black Wrigley Smith", ...]

Part 1 – processList

bit.ly/101fall14-1009-04

- Given a list of strings that have the name of a course (one word), followed by last names of people in the course:
  - Convert list into lists of strings of names for each course

["econ101 Abroms Curtson Williams Smith",

"history230 Black Wrigley Smith", ...]

[[‘Abroms’, ‘Curtson’, ‘Williams’, ‘Smith’],
[‘Black’, ‘Wrigley’, ‘Smith’, ...]]

Part 2 – peopleTakingCourses

bit.ly/101fall14-1009-05

- Given a list of strings that have the name of a course (one word), followed by last names of people in the course:
  - Find total number of people taking any course

["econ101 Abroms Curtson Williams Smith",

"history230 Black Wrigley Smith", ...]

6…

Part 3 – unionAllSetsButMe

bit.ly/101fall14-1009-06

- Given a list of strings that have the name of a course (one word), followed by last names of people in the course:
  - Find number of people taking just one course
    - BUT FIRST, lets write this helper method

["econ101 Abroms Curtson Williams Smith",

"history230 Black Wrigley Smith", ...]

Part 4 – peopleTakingOnlyOneCourse

bit.ly/101fall14-1009-07

- Given a list of strings that have the name of a course (one word), followed by last names of people in the course:
  - Find number of people taking just one course

["econ101 Abroms Curtson Williams Smith",

"history230 Black Wrigley Smith", ...]

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APT - UniqueZoo

- How do you solve this problem?
- How is it similar to the problem we just solved