61A Lecture 11

Friday, September 21

Midterm 1 Recap

The exam was more difficult than the Fall 2011 Midterm 1

Typically, more than 75% of students receive A's & B's in 61A

Problem 4(c): **through** doesn't rhyme with **cough**, and
20 *(twenty)* doesn't rhyme with **10** *(ten)*

Sight rhyme: A pair of words that don't rhyme, but look like they should

twelve *twenty-two*

1X vs **WX**

```
if first_tens(p)==1:
    return second_tens(p)!=1
else:
    return second_tens(p)==1
```

twenty-two *twelve*

WX vs **1X**

zero *twenty* ✓
twenty *zero* ✓

X0 vs **Y0**

```
if first_tens(p)==0:
    return second_tens(p)!=0
else:
    return second_tens(p)==0
```

"You may not use boolean operator **or***"*

Demo

Mapping a Function over a Sequence

Apply a function to each element of the sequence

```
>>> alternates = (-1, 2, -3, 4, -5)

>>> tuple(map(abs, alternates))
(1, 2, 3, 4, 5)
```

The returned value of **map** is an iterable map object

A constructor for the built-in map type

The returned value of **filter** is an iterable filter object

Demo

Accumulation and Iterable Values

Iterable objects give access to some elements in order.

However, you may only be able to access the elements once!

Many built-in functions take iterable objects as argument.

tuple	Return a tuple containing the elements
sum	Return the sum of the elements
min	Return the minimum of the elements
max	Return the maximum of the elements

For statements also operate on iterable values.

Reducing a Sequence

Reduce is a higher-order generalization of max, min, & sum.

```
>>> from operator import mul

>>> from functools import reduce

>>> reduce(mul, (1, 2, 3, 4, 5))
120
```

First argument: A two-argument function

Second argument: an iterable object

Like accumulate from Homework 2, but with iterable objects

Generator Expressions

One large expression that evaluates to an iterable object

```
(<map exp> for <name> in <iter exp> if <filter exp>)
```

- Evaluates to an iterable object.
- <iter exp> is evaluated when the generator expression is evaluated.
- Remaining expressions are evaluated when elements are accessed.

Short version: `(<map exp> for <name> in <iter exp>)`

Precise evaluation rule introduced in Chapter 4.

Demo

Python Lists

['Demo']

http://docs.python.org/py3k/library/stdtypes.html#mutable-sequence-types

List Comprehensions

```
[<map exp> for <name> in <iter exp> if <filter exp>]

Short version: [<map exp> for <name> in <iter exp>]
```

Unlike generator expressions, the map expression is evaluated when the list comprehension is evaluated.

```
>>> suits = ['heart', 'diamond', 'spade', 'club']
>>> from unicodedata import lookup
>>> [lookup('WHITE ' + s.upper() + ' SUIT') for s in suits]
['♡', '♢', '♤', '♧']
```

Dictionaries

{'Dem': 0}

Limitations on Dictionaries

Dictionaries are **unordered** collections of key-value pairs.

Dictionary keys do have two restrictions:

- A key of a dictionary **cannot be** an object of **a mutable built-in** type.
- Two **keys cannot be equal.** There can be at most one value for a given key.

This first restriction is tied to Python's underlying implementation of dictionaries.

The second restriction is an intentional consequence of the dictionary abstraction.