CS 1110

Prelim 1 Review
Fall 2012

Exam Info

- Prelim 1: 7:30–9:00PM, Thursday, October 4th
  - Last name **A – P** in Kennedy 1116
  - Last name **R – T** in Warren 131
  - Last name **U – Z** in Warren 231
- To help you study:
  - Study guides, review slides are online
  - Solutions to Assignment 2 are in CMS
- Arrive early! Helps reducing stress
- Grades released the same evening (if possible)

What is on the Exam?

- Five Questions (+2pts for name, netid):
  - String slicing functions (A1)
  - Call frames and the call stack (A2)
  - Functions on mutable objects (A3)
  - Testing and debugging (A1, Lab 3)
  - Short Answer (Terminology)
- Roughly equal weight each

What is on the Exam?

- String slicing functions (A1)
  - Will be given a function specification
  - Implement it using string methods, slicing
- Call frames and the call stack (A2)
- Functions on mutable objects (A3)
- Testing and debugging (A1, Lab 3)
- Short Answer (Terminology)

String Slicing

```
def make_netid(name,n):
    """Returns a netid for name with suffix n

    Netid is either two letters and a number (if the student has no
    middle name) or three letters and a number (if the student has
    a middle name).  Letters in netid are lowercase.

    Example: make_netid('Walker McMillan White',2) is 'wmw2'

    Example: make_netid('Walker White',4) is 'wmw4'

    Precondition: name is a string either with format '<first-name>
    <last-name>' or '<first-name> <middle-name> <last-name>';
    names are separated by spaces.  n > 0 is an int."""
```

Useful String Methods

Method	Result
s.find(s1)	Returns first position of s1 in s; -1 if not there.
s.rfind(s1)	Returns LAST position of s1 in s; -1 if not there.
s.lower()	Returns copy of s with all letters lower case
s.upper()	Returns copy of s with all letters upper case

- We will give you any methods you need
- But you must know how to slice strings!

String Slicing

```
def make_netid(name,n):
    """Returns a netid for name with suffix n."""
    name = name.lower() # switch to lower case
    fpos = name.find(' ')   # find first space
    first = name[:fpos]
    last = name[fpos+1:]
    mpos = last.find(' ')    # see if there is another space
    if mpos == -1:
        return first[0]+last[0]+`n`  # remember, n is not a string
    else:
        middle = last[:mpos]
        last = last[mpos+1:]
        return first[0]+middle[0]+last[0]+`n`
```

What is on the Exam?

- String slicing functions (A1)
- Call frames and the call stack (A2)
  - **Very** similar to A2 (see solution in CMS)
  - May have to draw a full call stack
  - See lectures 5 and 9 (slide typos corrected)
- Functions on mutable objects (A3)
- Testing and debugging (A1, Lab 3)
- Short Answer (Terminology)

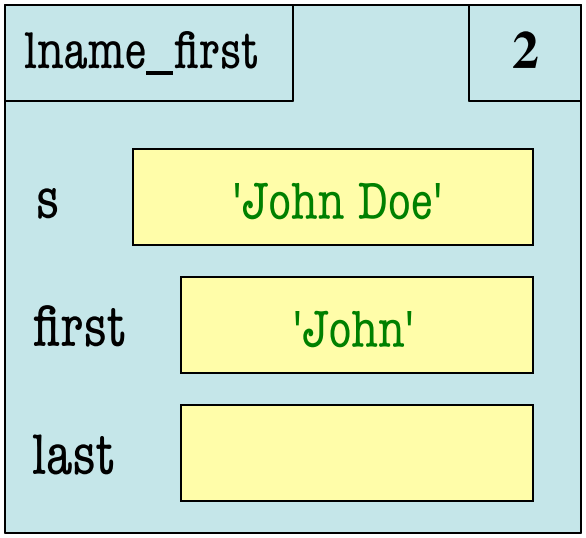
Call Stack Example

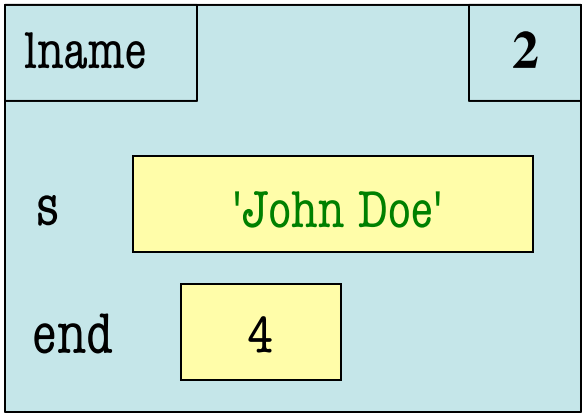
- Given functions to right
  - Function fname() is not important for problem
  - Use the numbers given
- Execute the call: lname_first('John Doe')
- Draw **entire** call stack when helper function lname completes line 1
  - Draw nothing else

```
def lname_first(s):
    """Precondition: s in the form
    <first-name> <last-name>"""
1   first = fname(s)
2   last = lname(s)
3   return last + ',' + first
```

```
def lname(s):
    """Prec: see last_name_first"""
1   end = s.find(' ')
2   return s[end+1:]
```

Call Stack Example: lname_first('John Doe')



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    """Precondition: s in the form
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1   first = fname(s)
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def lname(s):
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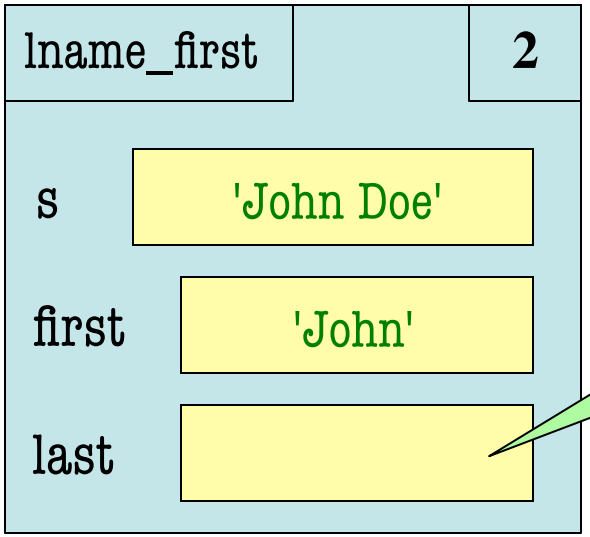
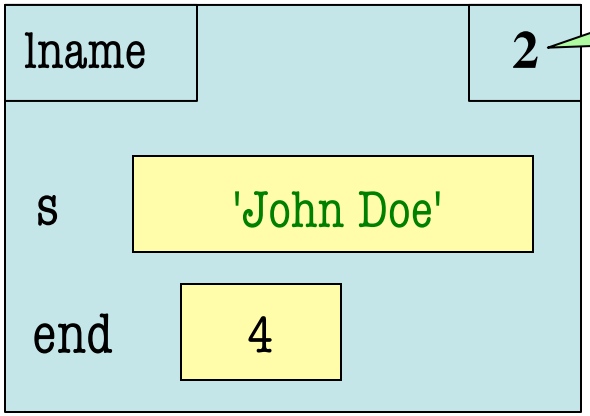
Call Stack Example: lname_first('John Doe')





Omitting this is okay.
Line 2 is not complete.

Line 1 is **complete**.
Counter is next line.

```
def lname_first(s):
    """Prec: s in the form
    <first-name> <last-name>"""
    first = fname(s)
2   last = lname(s)
    return first + ' ' + last

def lname(s):
    """Prec: see last_name_first"""
1   end = s.find(' ')
2   return s[end+1:]
```

Example with a Mutable Object

```
def shift(p):
    """Shift coords left
    Precondition: p a point"""
1   temp = p.x
2   p.x = p.y
3   p.y = p.z
4   p.z = temp
```

- May get a function on a mutable object

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

- You are not expected to come up w/ the "folder"
  - Will provide it for you
  - You just track changes

Example with a Mutable Object

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def shift(p):
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    Precondition: p a point"""
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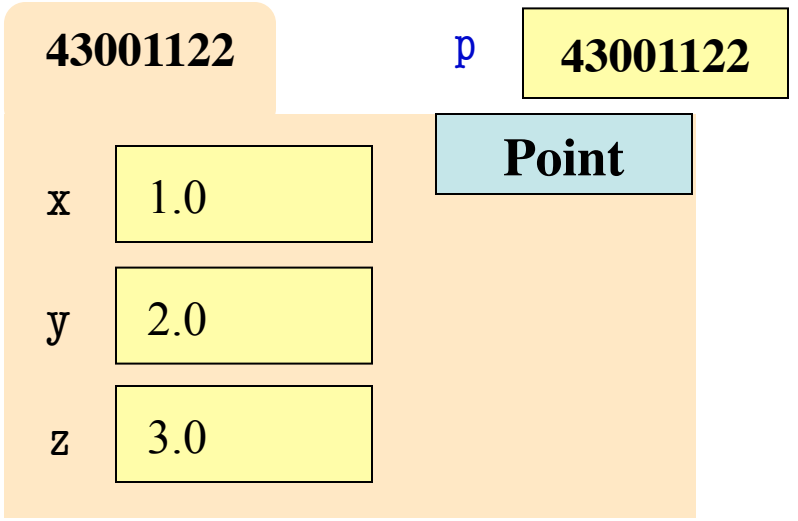
4   p.z = temp
```

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

Function Call



Example with a Mutable Object

```
def shift(p):
    """Shift coords left
    Precondition: p a point"""
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```

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>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
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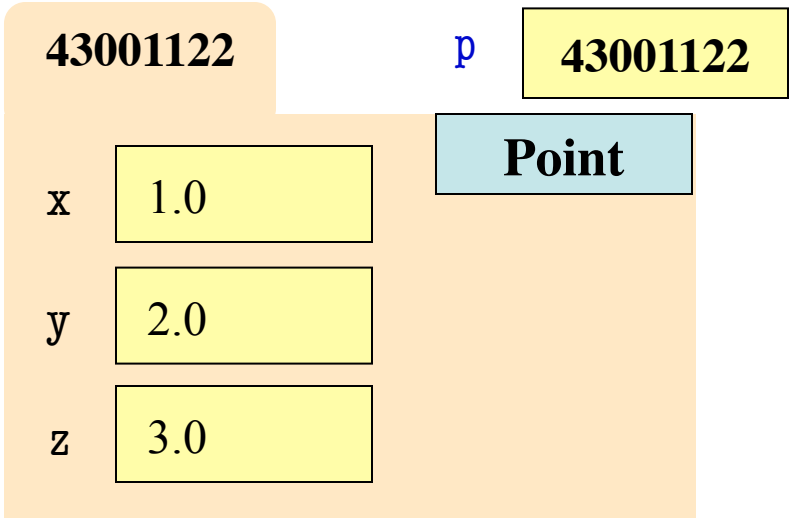
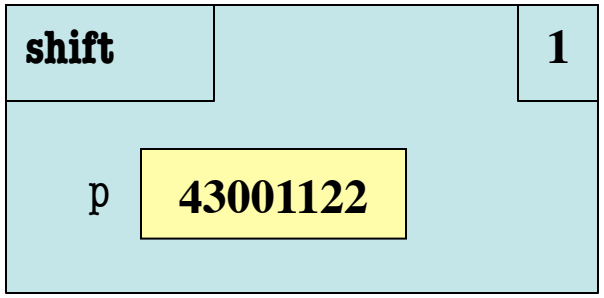
Function Call





Example with a Mutable Object

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>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
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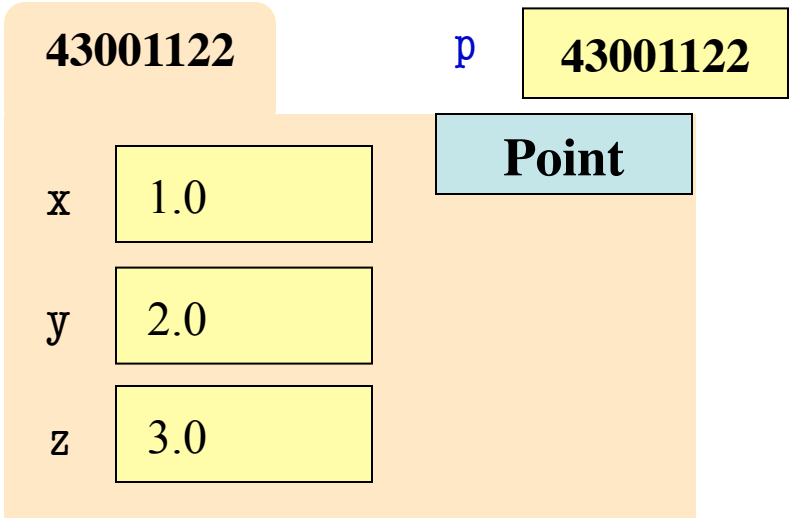
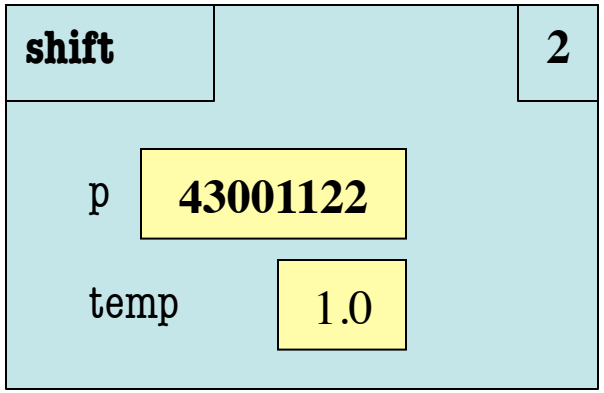
Function Call





Example with a Mutable Object

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def shift(p):
    """Shift coords left
    Precondition: p a point"""
1   temp = p.x
2   p.x = p.y
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4   p.z = temp
```
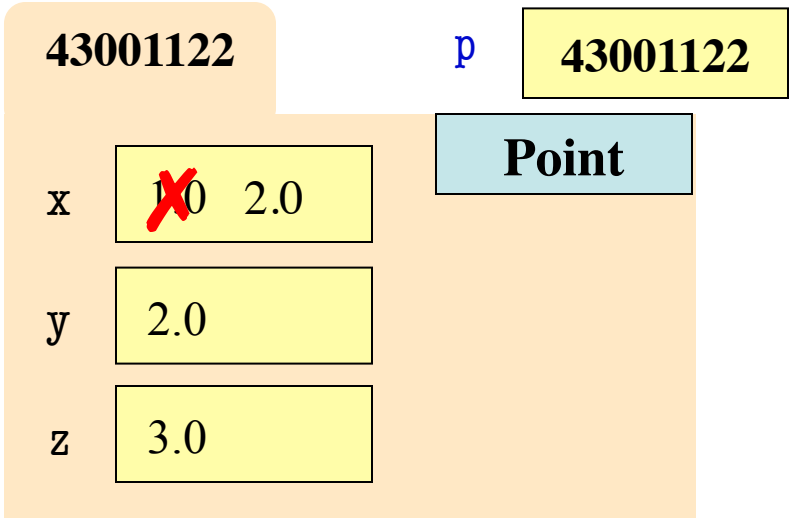
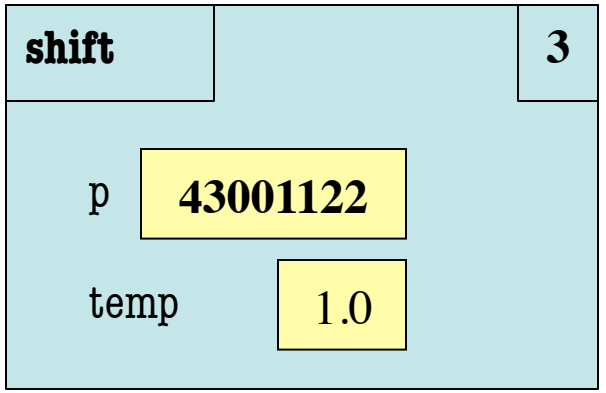

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

Function Call





Example with a Mutable Object

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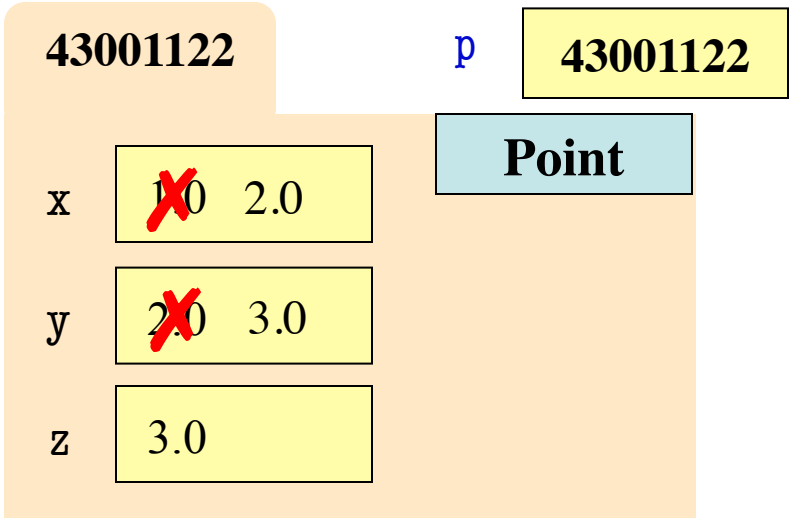
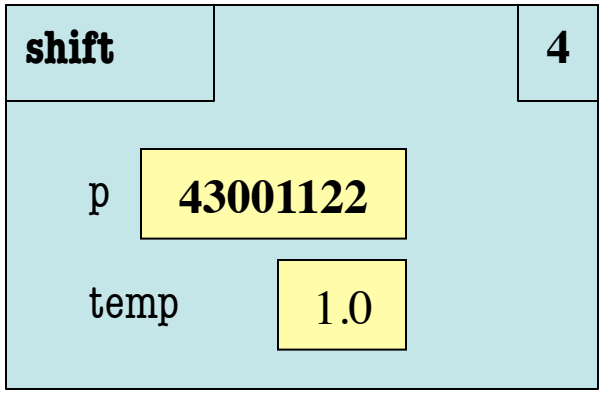
```

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

Function Call





Example with a Mutable Object

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```
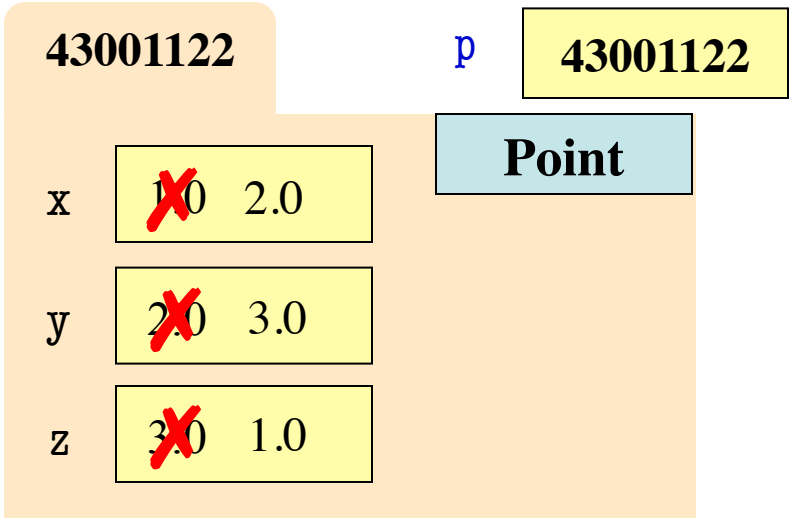
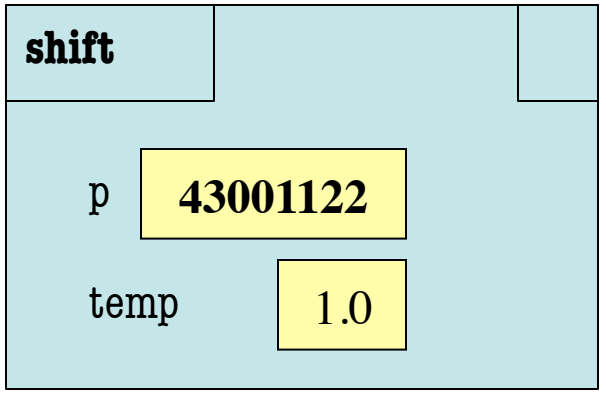

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

Function Call





What is on the Exam?

- String slicing functions (A1)
- Call frames and the call stack (A2)
- Functions on mutable objects (A3)
  - Given an object type (e.g. class)
  - Attributes will have invariants
  - Write a function respecting invariants
- Testing and debugging (A1, Lab 3)
- Short Answer (Terminology)

Example from Assignment 3

- Type: RGB
  - Constructor function: RGB(r,g,b)
  - Remember constructor is just a function that gives us back a mutable object of that type
  - Attributes:

Attribute	Invariant
red	int, within range 0..255
green	int, within range 0..255
blue	int, within range 0..255

Function that Modifies Object

```
def lighten(rgb):
    """Lighten each attribute by 10%
    Attributes get ligher when they increase.
    Precondition: rgb an RGB object"""
    pass # implement me
```

Function that Modifies Object

Procedure:
no return

```
def lighten(rgb):
    """Lighten each attribute by 10%"""
    red = rgb.red  # puts red attribute in local var
    red = 1.1*red # increase by 10%
    red = int(round(red,0))  # convert to closest int
    rgb.red = min(255,red)  # cannot go over 255
    # Do the others in one line
    rgb.green = min(255,int(round(1.1*rgb.green,0)))
    rgb.blue = min(255,int(round(1.1*rgb.blue,0)))
```

Another Example

- Type: Length
  - Constructor function: Length(ft,in)
  - Remember constructor is just a function that gives us back a mutable object of that type
  - Attributes:

Attribute	Invariant
feet	int, non-negative, = 12 in
inches	int, within range 0..11

Function that Does Not Modify Object

```
def difference(len1,len2):
    """Returns: Difference between len1 and len2

    Result is returned in inches

    Precondition: len1 and len2 are length objects
    len1 is longer than len2"""
    pass # implement me
```

Function that Does Not Modify Object

```
def difference(len1,len2):
    """Returns: Difference between len1 and len2
    Result is returned in inches
    Precondition: len1 and len2 are length objects
    len1 is longer than len2"""
    feetdif = (len1.feet-len2.feet)*12
    inchdif = len1.inches-len2.inches # may be negative
    return feetdif+inchdif
```

What is on the Exam?

- String slicing functions (A1)
- Call frames and the call stack (A2)
- Functions on mutable objects (A3)
- Testing and debugging (A1, Lab 3)
  - Coming up with test cases
  - Tracing program flow
  - Understanding asserts, try-except
- Short Answer (Terminology)

Picking Test Cases

```
def pigify(w):
    """Returns: copy of w converted to Pig Latin
    'y' is a vowel if it is not the first letter
    If word begins with a vowel, append 'hay'
    If word starts with 'q', assume followed by 'u';
    move 'qu' to the end, and append 'ay'
    If word begins with a consonant, move all
    consonants up to first vowel to end and add 'ay'
    Precondition: w contains only (lowercase) letters"""
```

Picking Test Cases

```
def pigify(w):
    """Returns: copy of w converted to Pig Latin"""
    …
```

- Test Cases (Determined by the rules):
  - are => arehay (Starts with vowel)
  - quiet => ietquay (Starts with qu)
  - ship => ipshay (Starts with consonant(s))
  - bzzz => bzzzay (All consonants)
  - yield => ieldyay (y as consonant)
  - byline => ylinebay (y as vowel)

Tracing Control Flow

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    assert x < 1
    print 'Ending third.'
```

What is the output of first(2)?

Tracing Control Flow

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    assert x < 1
    print 'Ending third.'
```

What is the output of first(2)?

'Starting first.'

'Starting second.'

'Starting third.'

'Caught at second'

'Ending second'

'Ending first'

Tracing Control Flow

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    assert x < 1
    print 'Ending third.'
```

What is the output of first(0)?

Tracing Control Flow

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    assert x < 1
    print 'Ending third.'
```

What is the output of first(0)?

'Starting first.'

'Starting second.'

'Starting third.'

'Ending third'

'Ending second'

'Ending first'

What is on the Exam?

- String slicing functions (A1)
- Call frames and the call stack (A2)
- Functions on mutable objects (A3)
- Testing and debugging (A1, Lab 3)
- Short Answer (Terminology)
  - See the study guide
  - Look at the lecture slides
  - Read relevant book chapters

In that order

Any More Questions?

Good Luck!