

CS 1110

Prelim 1 Review
Fall 2017

Exam Info

- Prelim 1: 7:30–9:00PM, Thursday, October 12th
 - Last name **A – J** in Uris G01
 - Last name **K – Z** in Statler Auditorium
 - SDS Students will get an e-mail
- To help you study:
 - Study guides, review slides are online
 - Solutions to Assignment 2 are in CMS
- Arrive early! Helps reducing stress

Grading

- We will announce *approximate* letter grades
 - We adjust letter grades based on all exams
 - But no hard guidelines (e.g. mean = grade X)
 - May adjust borderline grades again at final grades
- Use this to determine whether you want to drop
 - **Drop deadline** is next week, October 17th
 - **Goal:** Have everyone graded by end of Saturday
 - Will definitely notify you if you made less than C

What is on the Exam?

- **Five** Questions out of Six Topics:
 - String slicing functions (A1)
 - Call frames and the call stack (A2)
 - Functions on mutable objects (A3)
 - Testing and debugging (Lab 3 & 6, Lec. 11)
 - Lists and For-Loops (Lab 7)
 - Short Answer (Terminology)
- + 2 pts for writing your name and net-id

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 (Lab 3 & 6, Lecture 11)
- Lists and For-Loops (Lab 7)
- 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 'ww4'

Parameter name: the student name

Precondition: name is a string either with format '<first-name>
<last-name>' or '<first-name> <middle-name> <last-name>'

Parameter n: the netid suffix

Precondition: n > 0 is an int."""

Useful String Methods

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

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

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 4 and 9 (slide typos corrected)
- Functions on mutable objects (A3)
- Testing and debugging (Lab 3 & 6, Lecture 11)
- Lists and For-Loops (Lab 7)
- 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:]
```

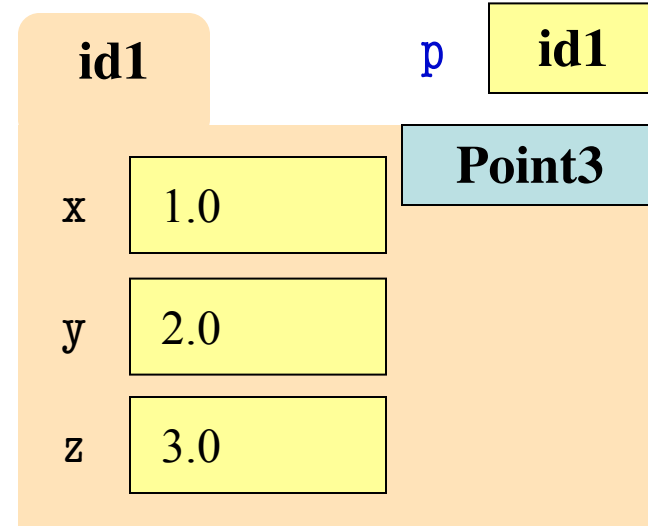
Example with a Mutable Object

```
def cycle_left(p):  
    """Cycle 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 = Point3(1.0,2.0,3.0)
 >>> cycle_left(p)
- You are not expected to come up w/ the “folder”
 - Will provide it for you
 - You just track changes
- **Diagram all steps**

Example with a Mutable Object

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



```
>>> p = Point3(1.0,2.0,3.0)
```

```
>>> cycle_left(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 (Lab 3 & 6, Lecture 11)
- Lists and For-Loops (Lab 7)
- Short Answer (Terminology)

Example from Assignment 3

- Class: 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 lighter when they increase.
```

```
    Parameter rgb: the color to lighten
```

```
    Precondition: rgb an RGB object"""
```

```
    pass # implement me
```

Another Example

- Class: 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
```

```
    Parameter len1: the first length
```

```
    Precondition: len1 is a length object longer than len2
```

```
    Parameter len2: the second length
```

```
    Precondition: len2 is a length object shorter than len1"""
```

```
    pass # implement me
```


What is on the Exam?

- String slicing functions (A1)
- Call frames and the call stack (A2)
- Functions on mutable objects (A3)
- Testing and debugging (Lab 3 & 6, Lecture 11)
 - Coming up with test cases
 - Tracing program flow
 - Understanding assert statements
- Lists and For-Loops (Lab 7)
- 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'
```

```
    Parameter w: the word to translate
```

```
    Precondition: w contains only (lowercase) letters"""
```

Debugging Example

```
def replace_first(word,a,b):
```

```
    """Returns: a copy with FIRST instance of a replaced by b
```

```
    Example: replace_first('crane','a','o') returns 'crone'
```

```
    Example: replace_first('poll','l','o') returns 'pool'
```

```
    Parameter word: The string to copy and replace
```

```
    Precondition: word is a string
```

```
    Parameter a: The substring to find in word
```

```
    Precondition: a is a valid substring of word
```

```
    Parameter b: The substring to use in place of a
```

```
    Precondition: b is a string"""
```

Debugging Example

```
def replace_first(word,a,b):  
    """Returns: a copy with  
    FIRST a replaced by b"""  
  
    pos = word.rfind(a)  
    print(pos)  
    before = word[:pos]  
    print(before)  
    after = word[pos+1:]  
    print(after)  
    result = before+b+after  
    print(result)  
    return result
```

```
>>> replace_first('poll', 'l', 'o')  
3  
pol  
  
polo  
'polo'  
  
>>> replace_first('askew', 'sk', 'ch')  
1  
a  
kew  
achkew  
'achkew'
```

Identify the bug(s)
in this function.

What is on the Exam?

- String slicing functions (A1)
- Call frames and the call stack (A2)
- Functions on mutable objects (A3)
- Testing and debugging (Lab 3 & 6, Lecture 11)
- Lists and For-Loops (Lab 7)
 - Given a function specification
 - Implement it using a for-loop
 - Challenge is how to use accumulators
- Short Answer (Terminology)

Useful List Methods

Method	Result
<code>x.index(a)</code>	Returns first position of <code>a</code> in <code>x</code> ; error if not there
<code>x.append(a)</code>	Modify <code>x</code> to add element <code>a</code> to the end
<code>x.insert(a,k)</code>	Modify <code>x</code> to put <code>a</code> at position <code>k</code> (and move rest to right)
<code>x.remove(a)</code>	Modify <code>x</code> to remove first occurrence of <code>a</code>
<code>x.sort()</code>	Modify <code>x</code> so that elements are in sorted order

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

For-Loop in a Fruitful Function

```
def replace(thelist,a,b):
```

```
    """Returns: COPY of thelist with all occurrences of a replaced by b
```

```
    Example: replace([1,2,3,1], 1, 4) = [4,2,3,4].
```

```
    Parameter thelist: list to copy
```

```
    Precondition: thelist is a list of ints
```

```
    Parameter a: the value to remove
```

```
    Precondition: a is an int
```

```
    Parameter b: the value to insert
```

```
    Precondition: b is an int """
```

```
    return [] # Stub return. IMPLEMENT ME
```

For-Loop in a Procedure

```
def pairswap(seq):
```

```
    """MODIFIES thelist, swapping each two elements with each other
```

```
    Example: if a = [0,2,4,5], pairswap(a) makes a into [2,0,5,4]
```

```
               if a = [1,2], pairswap(a) turns a into [2,1]
```

```
    Parameter thelist: list to modify
```

```
    Precondition: thelist is a list with an even number of elements."""
```

```
    pass # implement me
```


What is on the Exam?

- String slicing functions (A1)
 - Call frames and the call stack (A2)
 - Functions on mutable objects (A3)
 - Testing and debugging (Lab 3 & 6, Lecture 10)
 - Lists and For-Loops (Lab 7)
 - **Short Answer (Terminology)**
 - See the study guide
 - Look at the lecture slides
 - Read relevant book chapters
- In that order

