Exam Info

• **Prelim 1**: Sunday, October 18th at 7:30 pm
  - In-person students in Barton Hall
  - SDS students in 114 Gates
  - *Exam Seating* contains room AND time to arrive
• Online students will work in Gradescope
  - *Exam Seating* contains your proctor information
  - Proctor will contact you directly
  - Proctor will hold mock exam to verify set-up
Studying for the Exam

- Read study guides, review slides online
  - Solution to review posted after review
- Review all labs and assignments
  - Solutions to Assignment 2 are in CMS
  - No solutions to code, but talk to TAs
- Look at exams from past years
  - Exams with solutions on course web page
  - Only look at the fall exams; spring is different
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 following week, October 28th
  ▪ **Goal:** Have everyone graded by end of week
  ▪ Will definitely notify you if you made less than C+
What is on the Exam?

• **Five** Questions on the following topics:
  - String slicing functions (A1)
  - Call frames and the call stack (A2)
  - Functions on mutable objects (A3)
  - Testing and debugging (Labs 6, 10, 11)
  - Short Answer (Terminology)

• + 2 pts for writing your name and net-id
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  - Testing and debugging
  - Short Answer
- + 2 pts for writing your name and net-id

Lists may appear in call frames or testing
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 (Labs 6, 10, 11)
- Short Answer (Terminology)
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 last'
    or 'first middle last'

    Parameter n: the netid suffix
    Precondition: n > 0 is an int."""
### Useful String Methods

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

- 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 10 (for call stack)
- Functions on mutable objects (A3)
- Testing and debugging (Labs 6, 10, 11)
- 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 10
  ▪ Draw nothing else

1. `def lname_first(s):`
2. `   """Pre: s in the form`
3. `   'first-name last-name' """
4. `   first = fname(s)`
5. `   last = lname(s)`
6. `   return last + ',' + first`
7. `def lname(s):`
8. `   """Pre: same as above"""
9. `   end = s.find(' ')`
10. `   return s[end+1:]`
Call Stack Example: `lname_first('John Doe')`

1. `def lname_first(s):`
2. """Pre: s in the form 'first-name last-name' """
3. `first = fname(s)`
4. `last = lname(s)`
5. `return last + ',' + first`
6. 
7. 
8. `def lname(s):`
9. """Pre: same as above"""
10. `end = s.find(' ')`
11. `return s[end+1:]`

Must be in **middle** of this function call.

When this line is **complete**.
Example with a Mutable Object

1. `def cycle_left(p):

2.     """Cycle coords left

3.     **Pre:** p a point"""

4.    temp = p.x

5.    p.x = p.y

6.    p.y = p.z

7.    p.z = temp

- May get a function on a mutable object
  
  ```python
  >>> 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

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

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

>>> cycle_left(p)
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 (Labs 6, 10, 11)
• 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:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Invariant</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>int, within range 0..255</td>
</tr>
<tr>
<td>green</td>
<td>int, within range 0..255</td>
</tr>
<tr>
<td>blue</td>
<td>int, within range 0..255</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Invariant</th>
</tr>
</thead>
<tbody>
<tr>
<td>feet</td>
<td>int, non-negative, = 12 in</td>
</tr>
<tr>
<td>inches</td>
<td>int, within range 0..11</td>
</tr>
</tbody>
</table>
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 6, 10, 11)
  - Coming up with test cases
  - Tracing program flow
  - Understanding assert statements
- Short Answer (Terminology)
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"
"""
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

```python
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'
```

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 (Labs 6, 10, 11)
• Short Answer (Terminology)
  ▪ See the study guide
  ▪ Look at the lecture slides
  ▪ Read relevant book chapters

In that order

See the study guide
Look at the lecture slides
Read relevant book chapters
Open to Questions
Good Luck!