CS 1110

Prelim 1 Review
Spring 2017

Exam Info

- Prelim 1: 7:30–9:00PM, Tuesday, March 14th
  - Baker Lab 200, Rockefeller Hall 201, 203
  - No Electronics, No Notes, Closed book.
  - Bring your Cornell ID
  - Put your Name & NetId on Each Page!!!

What is on the Exam?

- String slicing functions (A1, Lab 3)
- Booleans & Conditionals (Lab 1, Lab 5)
- Testing and debugging (A1, Lab 3)
- Object and Memory Diagramming (A2)
- Working with Objects (Lab 5)
- Lists and For-Loops (Lab 6)
- Terminology

Not a Complete list, but the major Highlights…

What is on the Exam?

- String slicing functions (A1, Lab 3)
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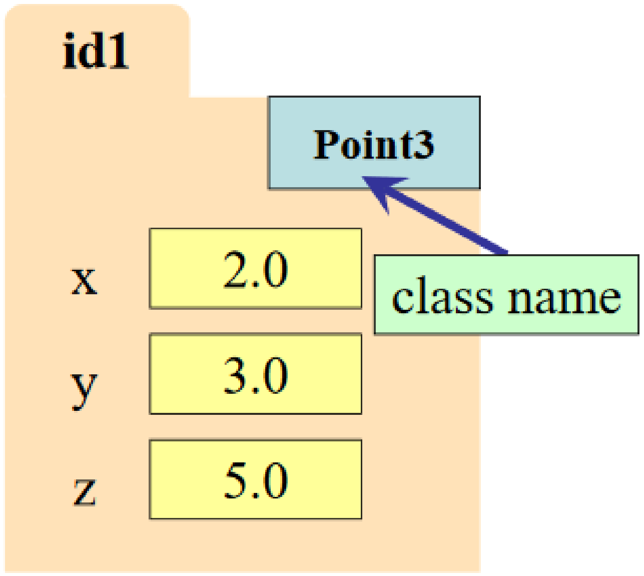
What are Objects?

- An object is like a folder; It contains other variables (Attributes) with values
- Extends the built in Types in Python
- It has a unique ID that identifies it
  - Cannot ever change
  - Has no meaning; only identifies
- Classes provide a "Template"



Working with Objects

- 3 Major things we'll ask you to do with objects:
  - Access Attributes of an object
  - Create a new object
  - Modify an existing object (objects are <u>mutable</u>)

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

Accessing Object Attributes

```
def area(len1,len2):
    """Returns: Area of a rectangle (float) with sides
       len1 and len2 in square feet
    Parameter len1: the first length
    Parameter len2: the second length
    Precondition: len1, len2 length objects"""
    pass # implement me
```

Accessing Object Attributes

```
def area(len1,len2):
    """Returns: Area of a rectangle (float) with sides
        len1 and len2 in square feet

    Parameter len1: the first length
    Parameter len2: the second length
    Precondition: len1, len2 length objects"""
    len1_ft = len1.feet + len1.inches/12.0
    len2_ft = len2.feet + len2.inches/12.0
    return len1_ft * len2_ft
```

Accessing Object Attributes

```
def area(len1,len2):
    """Returns: Area of a rectangle (float) with sides
        len1 and len2 in square feet
    Parameter len1: the first length
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    Precondition: len1, len2 length objects"""
    len1_ft = len1.feet + len1.inches/12.0
    len2_ft = len2.feet + len2.inches/12.0
    return len1_ft * len2_ft
```

Why divide by 12.0, not 12?

Let’s Diagram this!

```
def area(len1,len2):
    """Spec"""
    len1_ft = len1.feet + len1.inches/12.0
    len2_ft = len2.feet + len2.inches/12.0
    return len1_ft * len2_ft

a1 = Length(1, 6)
a2 = Length(2, 0)
rect_area = area(a1, a2)
```

Creating New Objects

```
def difference(len1,len2):
    """Returns: A length object that is the Difference
        between len1 and len2
    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
```

Creating New Objects

```
def difference(len1,len2):
    """“spec"""
    new_feet = len1.feet – len2.feet
    new_inches = len1.inches – len2.inches
    if new_inches < 0:
        new_feet = new_feet – 1
        new_inches = new_inches + 12
     return Length(new_feet, new_inches)
```

A slight twist: modifying objects

```
def difference2(len1,len2):
    """Modifies len1 by subtracting len2 from it
    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
```

A slight twist: modifying objects

```
def difference2(len1,len2):
    """"spec""""
    new_feet = len1.feet – len2.feet
    new_inches = len1.inches – len2.inches
    if new_inches < 0:
        new_feet = new_feet – 1
        new_inches = new_inches + 12
    len1.feet = new_feet
    len1.inches = new_inches
```

For Loops

- Syntax:

```
for item in list:
    <do something>
```

- Range Function:
  - range(n) returns a list [0, 1, 2, …. n-2, n-1]
  - This list has n elements
  - MUST use for modifying a list, so you can get the indices

Useful List Methods

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

- We will give you any methods you need.
  - Note: No x.find(a) for lists!
  - 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 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]."""
    result = [] # Accumulator
    for x in thelist:
        if x == a:
            result.append(b)
        else:
            result.append(x)
    return result
```

An Alternate Solution

```
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]."""
    result = [] # Accumulator
    for i in range(len(thelist)):
        if thelist[i] == a:
            result.append(b)
        else:
            result.append(thelist[i])
    return result
```

An Alternate Solution

```
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]."""
    result = [] # Accumulator
    for i in range(len(thelist)):
        if thelist[i] == a:
            result.append(b)
        else:
            result.append(thelist[i])
    return result
```

How would you write this function if it was to modify thelist instead?

Good Luck!