6.00 Quiz 2, November 12, 2013

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Name

1. ______/24
2. ______/6
3. ______/15
4. ______/25
5. ______/20
6. ______/10

Total ______/100

This quiz is open book and open notes, but do not use a computer. You have 120 minutes.

Please write your name on the top of each page, and your user name and the hour of the recitation you attend on the first page. Answer all questions in the boxes provided.
2) [6 points] What does the following code print?

```python
def divide_nums(x, y):
    try:
        print str(x) + "/" + str(y) + " is " + str(float(x)/y)
    except ZeroDivisionError:
        print "Cannot divide by zero."
    finally:
        print "Done."

divide_nums(3,5)
divide_nums(0,5)
divide_nums(3,0)
```
3) Consider the Rational class below.
a) [10 points] Implement the + operator to work between two Rational objects. 
   Implement the str() operator to work on a Rational object.

class Rational(object):
    # A rational number consists of a numerator and denominator
    def __init__(self, numerator, denominator):
        """Create the rational number numerator/denominator""
        self.n = numerator
        self.d = denominator
    def get_num(self):
        return self.n
    def get_den(self):
        return self.d
    def __add__(self, other):
        """Returns a Rational object corresponding to the sum
        a/b + c/d = (a*d + c*b) / b*d.
        Presenting in the lowest terms is optional.""
        def __str__(self):
            """ Returns the Rational in the form a/b, eg. '3/4' ""

b) [5 points] What does the following code print?

    r = Rational(3, 2)
    s = Rational(1, 4)
    t = r + s
    print str(s) + " + " + str(r) + " = " + str(t)
4) Items added to a PriorityQueue are added to the end of the queue. Removing from the PriorityQueue means deleting the item with the highest priority. Assume items added are tuples. The first component of the tuple is the item value and the second is the priority (an integer).

a) [20 points] Implement, using lists, the insert(), remove(), is_empty(), and size() functions for the class PriorityQueue.

 Hint. The del operator deletes an item at an index from a Python list.
 Ex. Z = [2, 3, 4] and del z[1] will have changed z to be [2, 4]

```python
class PriorityQueue:
    # A queue when adding items; items added at the end.
    # When removing, remove the item with the highest priority.
    # Item is a tuple (item_value, priority).
    def __init__(self):
        self.items = []

    def __str__(self):
        """ Prints each element of the PriorityQueue on a separate line, in order they were inserted ""
        ret = ""
        for i in self.items:
            ret += str(i) + "\n"
        return ret

    def is_empty(self):
        """ Returns True if it contains no items ""

    def size(self):
        """ Returns how many items are in the queue""
```
def insert(self, item):
    """ Adds an item to the queue. The item is a tuple. 
    The first tuple component is the value, the 
    second component is the priority""

assert type(item) is tuple, "Not a tuple"

def remove(self):
    """ Assumes non-empty priority queue. Removes the tuple 
    item with the highest priority. Returns only the 
    value of item tuple, not the priority"""
b) [5 points] What does the following code print out?

```python
a = PriorityQueue()
print a.is_empty()
a.insert((1, 3))
a.insert((4, 2))
print a
print "Item removed: " + str(a.remove())
print a.is_empty()
print a
```