

CIS 210
Winter 2013 Final Exam

Write your name at the top of **each page** before you begin. 1 point for each page.

1. [5 points] What does `q1()` print?

```
def q1():
    x = 5498
    count = 0
    while x > 0:
        count += 1
        x = x // 10
    print(count)
```

2. [5 points] What does `q2()` print?

```
def perimeter( llx, lly, urx, ury ):
    """There should be a good docstring here,
    but it's an exam so I left it off.
    """
    width = urx - llx
    if width < 0:
        width = 0 - width
    height = ury - lly
    if height < 0:
        height = 0 - height
    p = (2 * width) + (2 * height)
    return p
```

```
def q2():
    pr = perimeter(9, 9, 5, 14)
    print(pr)
```

3. [5 points] What does q3() print?

```
def q3():  
    lis = [ -5, 7, -23, 3, 98, 10 ]  
    clamp(lis, 0, 10)  
    s = total(lis)  
    print(s)
```

```
def clamp(ar, min, max):  
    for i in range(len(ar)):  
        if ar[i] < min:  
            ar[i] = min  
        if ar[i] > max:  
            ar[i] = max  
    return
```

```
def total(ar):  
    t = 0  
    for elem in ar:  
        t += elem  
    return t
```

4. [5 points] What does q4() print?

```
class Character:
    def __init__(self, name, power, friendly):
        self.name = name
        self.power = power          #Integer, 1 = human
        self.friendly = friendly    #Integer, negative = unfriendly

    def __str__(self):
        return self.name

    def danger(self):
        if self.friendly < 0 :
            return 0 - (self.power * self.friendly)
        else:
            return 1

    def helpful(self):
        return self.power * self.friendly

def q4():
    moro    = Character("Moro, the wolf", 8, 2)
    kiki     = Character("Kiki, the witch", 1, 5)
    totoro  = Character("Totoro, the forest spirit", 8, 5)
    chihiro = Character("Chihiro, the child", 1, 1)
    yubaba  = Character("Yubaba, the witch", 8, -5)

    characters = [ chihiro, kiki, moro, totoro, yubaba ]
    helper = characters[0]
    for ch in characters:
        if ch.danger() > 1 :
            print("Watch out for ", ch.name)
        if ch.helpful() > helper.helpful():
            helper = ch
    print("Get help from ", helper)
```

5. [12 points] This question uses the Character class from the previous question. Complete the function, consistent with its docstring.

```
def count_helpful( lis ):
    """Number of Characters in lis that are helpful.
    Args:
        lis: a list of Character objects (see question 4).
    Returns:
        An integer count of the number of characters in lis
        with helpfulness > 0.
    Example:
        For the list characters = [ chihiro, kiki, moro, totoo, yubaba ]
        from question 4, count_helpful(characters) == 4 (everyone in the
        list except Yubaba is helpful).
    """
    # Your code here
```

6. [13 points] Recall the “split” function that divides a single string into a list of strings, breaking it around blanks or another character. In this problem you will write a similar function, but instead of splitting up a string of text, it splits a list of numbers. For example, `nsplit([5, 7, 7, 4, 3, 7], 7)` would return `[[5], [4, 3]]`. Complete the function, consistent with its docstring.

```
def nsplit( lis, border ):
    """Split a list of integers into sub-lists, splitting at border.
    Args:
        lis: A list of integers
        border: Break the list at each occurrence of one of more instances
                of this value.
    Returns:
        A list of non-empty sub-lists of lis,
        containing maximal sub-sequences of lis excluding the border value.
    Examples:
        nsplit( [5, 4, 3, 0, 2, 1, 0, 5], 0 ) = [[5, 4, 3], [2, 1], [5]]
        nsplit( [7, 7, 0, 0, 0, 5, 0], 0 ) = [[7, 7], [5]]
        nsplit( [ 0, 0, 0 ], 0) = [ ]
    """
```

7. [15 points] In the game Scrabble, the score for a word is based on the sum of the values of letters in that word. Function `highest_scrabble_score` takes a list of words, and chooses the word from the list that is worth the most points. The list `SCRABBLE_POINTS` describes the point values of all the English letters; each sub-list is a value followed by a string containing the letters with that value.

Complete `highest_scrabble_score`. You may optionally write additional functions to break your code down into simpler pieces.

```
SCRABBLE_POINTS = [[ 1, "eaionrtlsu"], [2, "dg"], [3, "bcmp"],
                   [ 4, "fhvwy"], [5, "k"], [8, "jx"], [10, "qz"]]
```

```
def highest_scrabble_score( lis ):
    """Select the word from lis with the highest Scrabble score,
    based on SCRABBLE_POINTS. For example, highest_scrabble_score(["totoro", "kiki" ])
    returns "kiki" because "totoro" scores 6 (1+1+1+1+1+1) and "kiki" scores 12 (5+1+5+1).
    Args:
        lis: A list of strings containing only lower case letters.
    Returns:
        The string from lis with the largest sum of letter values
        from SCRABBLE_POINTS. (Ties may be broken arbitrarily.)
    """
```

Your name: _____

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(Additional room for Question 7, if needed.)