**Lab 11 - Copying, tuples and list comprehension**

**Questions:**

**1.** Show the output for the following program. To make it easier, draw a diagram similar to the ones in lecture 9 pdf.

str\_list = ['hi','mom','dad',['grandma','grandpa']]

new\_list = str\_list

copy\_list = str\_list[:]

str\_list[0] = 'bye'

new\_list[1] = 'mother'

copy\_list[2] = 'father'

copy\_list[-1][0] = 'nanna'

str\_list = ['bye','mom','dad',['grandma','grandpa']]

new\_list = str\_list

copy\_list = str\_list[:]

print(str\_list) # Line 1   
['bye', 'mother', 'dad', ['nanna', 'grandpa']]

print(new\_list) # Line 2

['bye', 'mother', 'dad', ['nanna', 'grandpa']]

print(copy\_list) # Line 3

['hi', 'mom', 'father', ['nanna', 'grandpa']]

(a) What output is produced by Line 1 when the program is executed?

['bye', 'mother', 'dad', ['nanna', 'grandpa']]

(b) What output is produced by Line 2 when the program is executed?

['bye', 'mother', 'dad', ['nanna', 'grandpa']]

(c) What output is produced by Line 3 when the program is executed?

['hi', 'mom', 'father', ['nanna', 'grandpa']]

**2.** Consider:

ListA = [1,2,3,4,5]

ListB = ListA

ListA[2] = 10

What is the value of ListB[2]?

10

**3.** Consider the following code:

list1 = [1,2,99]

list2 = list1

list3 = list2

list1 = list1.remove(1)

print(list3)

(a) What is printed?

[2, 99]

(b) How can you change the code so list3 is unchanged?

list1 = [1,2,99]  
list2 = list1  
list3 = list2[:]  
list1 = list1.remove(1)  
  
print(list3)

**4.** Given a list L = [1,2,3,4], we want to convert the list to the string '1234'. We tried''.join([i for i in L]), but it didn't work. Fix it.

**5.** Fractions: You can express a fraction as a tuple: (numerator, denominator).

(a) Write a function that adds two fractions that are passed as tuples.

(b) Write a function that multiplies two fractions that are passed as tuples

**6.** Write a Python program to sort a tuple by its float element.

Sample data: [('item1', '12.20'), ('item2', '15.10'), ('item3', '24.5')]

Expected Output: [('item3', '24.5'), ('item2', '15.10'), ('item1', '12.20')]

**7.** Using list comprehension

(a) Generate a list of square numbers

(b) Convert a list of colors = ['Red', 'Blue', 'Green', 'Black', 'White'] to upper case  
(c) Find all of the numbers from 1-1000 that are divisible by 7

(d) Find all of the numbers from 1-1000 that have a 3 in them

(d) Count the number of spaces in a string

(e) Remove all of the vowels in a string

(f) Find all of the words in a string that are less than 4 letters

(g) Challenge! Use a nested list comprehension to find all of the numbers from 1-1000 that are divisible by any single digit besides 1 (2-9). The first part is given below. You need to find out the second list comprehension

[number **for** number **in** range(1, 1001) **if True in** [second list comprehension]]