CSX3001/ITX3001
FUNDAMENTALS OF COMPUTER PROGRAMMING

CLASS 08 LISTS IN PYTHON

ARRAYS AND PYTHON LISTS, INDEXING, SLICING, AND LIST UPDATING

PYTHON

ARRAYS

In programming, an array is a collection of elements of the same type. Arrays are popular in most programming languages like Java, C/C++, JavaScript and so on. However, in Python, they are not that common. When people talk about Python arrays, more often than not, they are talking about Python lists. Python lists are much more flexible than arrays. They can store elements of different data types including string. Also, lists are faster than arrays.

Note: arrays of numeric values are supported in Python by the array module.

LISTS

A list is created by placing all the items (elements) inside a square bracket ([ ]), separated by comma(,)s. List can contain any umber of items and they may be of different types.

```
# empty list
myList = []

#list of integers
intList = [-5,-3,-1,0,1,3, 5]

#list of mixed datatypes
mixList = [“Hello”, 7.545, True, 23]
```

LIST INDEX

Each item in a list can be accessed via index operator ([ ]). Index starts from 0. So, a list having 7 elements will have index from 0 to 6.

```
listExample = ['e','x','a','m','p','l','e']

# p will be printed out
print(listExample[4])

# The following code fragment will print all items
for i in range(len(listExample)):
  print(listExample[i])

# Different way but produce the same output
for item in listExample:
  print(item)
```

Python allows negative indexing for its sequences. The index of -1 refers to the last item, -2 to the second last item and so on.

```
aList = [3, 6, 9, 12, 15]

# The last item in aList will be printed out, 15
print(aList[-1])

# The first item in aList will be printed out, 3
print(aList[-5])
```

LIST SLICING

Slicing operator(:) can be used with a sequence (list, tuple, string). List can be sliced as same as string.

```
bList = ['a',1,'b',2,'c',3,'d',4]

# What will be printed out?
print(bList[::2])
print(bList[1::2])
print(blist[2:5])
```

LIST UPDATING

List item(s) can be changed by assignment operator (=)

```
bList = ['a',1,'b',2,'c',3,'d',4]
#update an item
bList[2] = 'B'
#see the result by yourselves
print(bList)
#update some parts of bList
bList[6:8] = ['D',8]
print(bList)
```

List can be added an item by using append() method or added several items using extend() method

```
cList = [0,2,4,6]
#add an item at the end of cList
cList.append(8)
#see the result by yourselves
print(cList)
#add more items at the end of cList
cList.extend([10,12,14])
print(cList)
```

Item(s) can be deleted from a list by using the keyword del or using the methods, remove() or pop().

```
listExample = ['e','x','a','m','p','l','e','s']

del listExample[7]
print(listExample)

del listExample[2:4]
```

What is/are the difference(s) in remove() and pop() method?
How to use these methods?

SOME PYTHON LIST METHOND

Python List Methods
append() - Add an element to the end of the list
extend() - Add all elements of a list to the another list
insert() - Insert an item at the defined index
remove() - Removes an item from the list
pop() - Removes and returns an element at the given index
clear() - Removes all items from the list
index() - Returns the index of the first matched item
count() - Returns the count of number of items passed as an argument
sort() - Sort items in a list in ascending order
reverse() - Reverse the order of items in the list
copy() - Returns a shallow copy of the list

Note: more list methods can be found in the following link,
https://www.programiz.com/python-programming/methods/list

- LIST EXERCISES

Complete the following exercises in Python IDLE or Jupyter notebook.

1) Write a Python program to sum all the items in a list
2) Write a Python program to multiplies all the items in a list.
3) Write a Python program to get the largest number from a list. You are not allowed to use max() function.
4) Write a Python program to get the smallest number from a list. You are not allowed to use min() function.
5) Write a Python program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.

   Sample List : ['abc', 'xyz', 'aba', '1221']

   Expected Result : 2
6) Write a Python program to convert a list of multiple integers into a single integer.

   Example:

   Original List: [10,20,30]

   Single Integer: 102030
7) Write a Python program to check a list is empty or not.
8) Write a Python program to clone or copy a list.

Note:

If you want to read multiple integer inputs into a list:

```
x = [int(x) for x in input("Enter a multiple integer value: ").split()]
print("Number of list is: ", x)
```

If you want to read multiple inputs (as string type) and store them in a list:

```
MyList2 = list((input("Enter a multiple value: ").split()))
print(MyList2)
```

ASSIGNMENTS

For each assignment, a file naming convention as follows:

for example, for assignment 1 will be named,

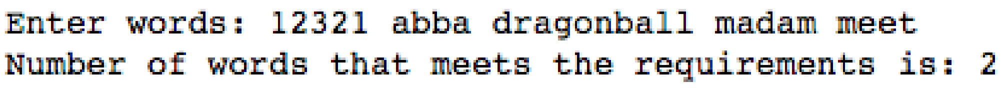
youridnamesectionclass08as#.py

for example, for assignment 1 will be named,

6310001_Harry_541_class08_as1.py

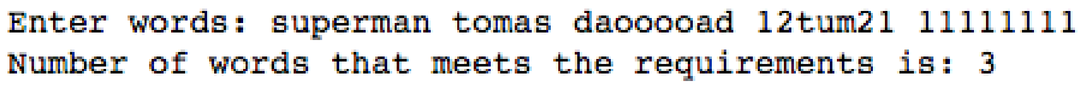
1. Write a Python code to take several strings (words, numeric, etc.) as inputs and determine a total number of strings that its length is greater than or equal to 4, and the first and the last two characters of such string are the same.

   Examples
   Run #1



```
Enter words: 12321 abba dragonball madam meet
Number of words that meets the requirements is: 2
```

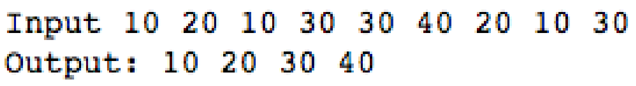
   Run #2



```
Enter words: superman tomas daoooad 12tum21 11111111
Number of words that meets the requirements is: 3
```

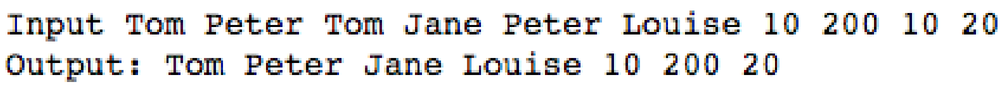
2. Write a Python code to print unique strings from the entered string inputs.

   Examples:
   Run #1



```
Input 10 20 10 30 30 40 20 10 30
Output: 10 20 30 40
```

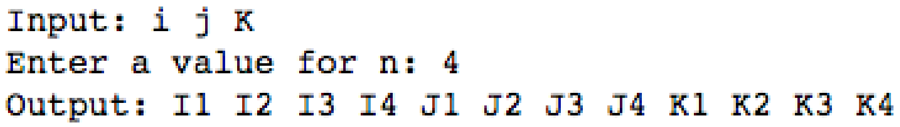
   Run #2



```
Input Tom Peter Tom Jane Peter Louise 10 200 10 20
Output: Tom Peter Jane Louise 10 200 20
```

3. Write a Python code to create a list (and print all elements in the list as an output) by concatenating each individual string (a single character) input with digits ranging from 1 to *n*. For the output, a character must be capitalized.

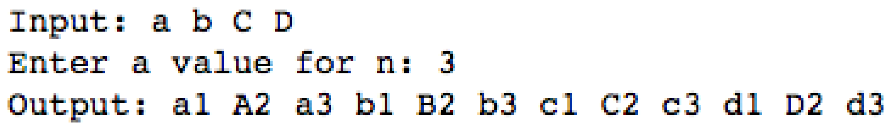
   Examples:
   Run#1



```
Input: i j K
Enter a value for n: 4
Output: I1 I2 I3 I4 J1 J2 J3 J4 K1 K2 K3 K4
```

4. Based on assignment 3, if an associated digit is an odd number, a character must be a lowercase letter.

   Examples:
   Run #1



```
Input: a b C D
Enter a value for n: 3
Output: a1 A2 a3 b1 B2 b3 c1 C2 c3 d1 D2 d3
```