

CSX3001/ITX3001
CS1201 COMPUTER PROGRAMMING 1

CLASS 07 ARRAYS (LISTS)

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(,). List can contain any number 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 METHODOND

[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,

◆ 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

Complete the following exercises in Python IDLE. You must name the python file as, `{your-id}_class0{number}_{course-code}_{section-number}_assignment{number}.py` for example, for assignment 1 will be named,

`6120001_class07_csx3001_541_assignment1.py`

1. Write a Python code to count the number of strings where the string length is 4 or more and the first two and last two character are same from entered list of strings.

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 daoooooad 12tum21 11111111
Number of words that meets the requirements is: 3
```

2. Write a Python code to print unique values from entered strings.

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 on the screen) by concatenating a given list with a number 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