Data Structures

What is a data structure

```
- A way of organizing the data is called ds
- We can store multiple values in a single variable

Types of ds
- list
- tuple
- dict
- set
```

List

```
- It is used to store multiple items in a single variable
- List is mutable(i.e We can change the values)
- It can allow the duplicates
- List index starts with '0'
- We can store any type of data
- Represented by [],values can be separated by ,
```

```
# how to create empty list
li = []
print(li)
print(type(li))
```

```
[]
<class 'list'>
```

```
li1 = [2,3,4,6,78,12,12,23,23,3,3,3,3,3,89]
print(li1)
print(type(li1))
```

```
[2, 3, 4, 6, 78, 12, 12, 23, 23, 3, 3, 3, 3, 3, 89]
<class 'list'>
```

```
li2 = [67,89,9.7,9.5,"a","b"]
print(li2,type(li2))
```

```
[67, 89, 9.7, 9.5, 'a', 'b'] <class 'list'>
```

```
# slicing  # cutting into pieces
li = [56,78,12,57,88,78,23,77]
print(li[0],li[1],li[2]) # forward index
```

```
print(li[-1],li[-2],li[-3])
print(li[0:3],li[3:])
print(li[0:8:2])
print(li[0::3])
print(li[::-1])  # reversed list
```

```
56 78 12
77 23 78
[56, 78, 12] [57, 88, 78, 23, 77]
[56, 12, 88, 23]
[56, 57, 23]
[77, 23, 78, 88, 57, 12, 78, 56]
```

```
# built-in methods
# sum(),min(),max(),sorted(),len()

li = [56,78,12,57,88,78,23,77]
print(sum(li))
print(min(li))
print(max(li))
print(sorted(li))
print(len(li))
```

```
469
12
88
[12, 23, 56, 57, 77, 78, 78, 88]
8
```

```
# how to list methods in python
print(dir(list),end=' ')
```

```
['__add__', '__class__', '__class_getitem__', '__contains__',
'__delattr__', '__delitem__', '__dir__', '__doc__', '__eq__',
'__format__', '__ge__', '__getattribute__', '__getitem__',
'__getstate__', '__gt__', '__hash__', '__iadd__', '__imul__',
'__init__', '__init_subclass__', '__iter__', '__le__', '__len__',
'__lt__', '__mul__', '__ne__', '__new__', '__reduce__',
'__reduce_ex__', '__repr__', '__reversed__', '__rmul__',
'__setattr__', '__setitem__', '__sizeof__', '__str__',
'__subclasshook__', 'append', 'clear', 'copy', 'count', 'extend',
'index', 'insert', 'pop', 'remove', 'reverse', 'sort']
```

```
# nested list
li2 = [78,4,6,[7,2,5,8,9],89,45,77]
print(li2)
```

```
[78, 4, 6, [7, 2, 5, 8, 9], 89, 45, 77]
```

```
print(li2[3])
print(li2[3][2])
print(li2[3][3])
```

```
[7, 2, 5, 8, 9]
5
8
```

list methods

```
# append() - we will add new value to the list
k = [67,23,68,90]
k.append(45)  # listname.methodname()-syntax
print(k)
```

```
[67, 23, 68, 90, 45]
```

```
# count()
# index()
k1 = [45,56,34,67,8,1,1,1,1,2,2,2,2,9]
k1.count(2)
```

```
4
```

```
# index()
k1.index(34)
```

```
2
```

```
k1.index(56)
```

```
1
```

```
k1.index(1)
```

```
5
```

```
# insert()
li = [67,33,23,55]
li.insert(3,8)
print(li)
```

```
[67, 33, 23, 8, 55]
```

```
# pop()
print(li)
li.pop()
```

```
[67, 33, 23, 8, 55]
```

```
55
```

```
print(li)
```

```
[67, 33, 23, 8]
```

```
# remove()-- particular value delete
li.remove(23)
print(li)
```

```
[67, 33, 8]
```

```
# copy()
list1 = [1,2,3,4]
list2 = list1.copy()
print(list2)
print(list1)
```

```
[1, 2, 3, 4]
[1, 2, 3, 4]
```

```
# copy()
list1 = [1,2,3,4]
list2 = list1.copy()
print(list2,list1)
list2.pop()
print(list1,list2)
```

```
[1, 2, 3, 4] [1, 2, 3, 4]
[1, 2, 3, 4] [1, 2, 3]
```

```
a = [3,4,5,7]
b = a
print(a)
print(b)
```

```
[3, 4, 5, 7]
[3, 4, 5, 7]
```

```
a = [3,4,5,7]
b = a
print(a,b)
a.pop()
print(a,b)
```

```
[3, 4, 5, 7] [3, 4, 5, 7]
[3, 4, 5] [3, 4, 5]
```

```
# del
li2 = [3,4,5,1,6,7,8,9]  # to delete more values at a time
del li2[1:3]

print(li2)
```

```
[3, 1, 6, 7, 8, 9]
```

```
# extend()
a,b = [1,2,3],[4,5,6]
a.extend(b)
print(a)
```

```
[1, 2, 3, 4, 5, 6]
```

```
b.extend(a)
print(b)
print(a,b)
```

```
[4, 5, 6, 1, 2, 3, 4, 5, 6, 1, 2, 3, 4, 5, 6]
[1, 2, 3, 4, 5, 6] [4, 5, 6, 1, 2, 3, 4, 5, 6, 1, 2, 3, 4, 5, 6]
```

```
# clear()
a.clear()
print(a)
```

```
[]
```

```
li = [4,5,6,1,2,3,9]
for i in li:
    print(i,end=' ')
```

```
4 5 6 1 2 3 9
```

```
# list values sum
s = 0
for i in li:
    s = s+i
print(s)
```

```
30
```

```
# list values product
f = 1
for i in li:
    f = f*i
print(f)
```

```
6480
```

```
# print only odd numbers in list
for i in li:
    if(i%2!=0):
        print(i,end=' ')
```

```
5 1 3 9
```

```
# print only even numbers in list
for i in li:
```

```
    if(i%2==0):
        print(i,end=' ')
```

```
4 6 2
```

```
n = int(input('How many items? '))
items = []
for i in range(n):
    item = int(input('Enter values: '))
    items.append(item)
print(items)
```

```
How many items?  4
Enter values:  1
Enter values:  2
Enter values:  3
Enter values:  4
```

```
[1, 2, 3, 4]
```

```
items = input().split()
print(items)
```

```
 a b c
```

```
['a', 'b', 'c']
```

```
# remove duplicate values in list
# i/p: [12,34,12,67,89,23,34,34,34,78,22,65]
# o/p: [12,34,67,89,23,78,22,65]
```