Batch:B2   Roll No.:   16010121110
Experiment / assignment / tutorial No.
Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

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TITLE: Basic Data structure in python

AIM: Use suitable methods to get output for given input.

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Expected OUTCOME of Experiment: Use of basic data structure in Python.

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Resource Needed: Python IDE

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Theory:

Python Collections (Arrays)

There are four collection data types in the Python programming language:

- **List** is a collection which is ordered and changeable. Allows duplicate members.
- Tuple is a collection which is ordered and unchangeable. Allows duplicate members.
- Set is a collection which is unordered and unindexed. No duplicate members.
- Dictionary is a collection which is unordered and changeable. No duplicate members.

When choosing a collection type, it is useful to understand the properties of that type. Choosing the right type for a particular data set could mean retention of meaning, and, it could mean an increase in efficiency or security.

List: Lists are used to store multiple items in a single variable. Lists are created using square brackets. e.g. mylist = ["apple", "banana", "cherry"]

List Methods

Python has a set of built-in methods that you can use on lists. L:list, e:element, i:index

Method	Description
L.append(e)	Adds an element at the end of the list
L.clear()	Removes all the elements from the list
L.copy()	Returns a copy of the list
L.count(e)	Returns the number of elements with the specified value
L.extend(L2)	Add the elements of a list (or any iterable), to the end of the current list
L.index(e)	Returns the index of the first element with the specified value
L.insert(i,e)	Adds an element at the specified position
L.pop(i)	Removes the element at the specified position
L.remove(e)	Removes the item with the specified value

L.reverse()	Reverses the order of the list
L.sort()	Sorts the list

Tuple

Tuples are used to store multiple items in a single variable. A tuple is a collection which is ordered and **unchangeable**. Tuples are written with round brackets.
e.g. mytuple = ("apple", "banana", "cherry")

Tuple Methods

Python has two built-in methods that you can use on tuples. T:tuple, e:element

Method	Description
T.count(e)	Returns the number of times a specified value occurs in a tuple
T.index(e)	Searches the tuple for a specified value and returns the position of where it was found

Set

Sets are used to store multiple items in a single variable. A set is a collection which is both *unordered* and *unindexed*. Sets are written with curly brackets.
e.g. myset = {"apple", "banana", "cherry"}

Set Methods

Python has a set of built-in methods that you can use on sets.

Method	Description
S.add(e)	Adds an element to the set
S.clear()	Removes all the elements from the set
S.copy()	Returns a copy of the set
S1.difference(S2)	Returns a set containing the difference between two or more sets
S1.difference_update(S2)	Removes the items in this set that are also included in another, specified set
S1.discard(e)	Remove the specified item
S1.intersection(S2)	Returns a set, that is the intersection of two other sets
S1.intersection_update(S2)	Removes the items in this set that are not present in other, specified set(s)
S1.isdisjoint(S2)	Returns whether two sets have a intersection or not
S1.issubset(S2)	Returns whether another set contains this set or not
S1.issuperset(S2)	Returns whether this set contains another set or not
S.pop()	Removes an element from the set
S.remove(e)	Removes the specified element
S1.symmetric_difference(S2)	Returns a set with the symmetric differences of two sets

S1.symmetric_difference_update(S2)	inserts the symmetric differences from this set and another
S1.union(S2)	Return a set containing the union of sets
S1.update(L1)	Update the set with the union of this set and others

Dictionary

Dictionaries are used to store data values in key:value pairs. A dictionary is a collection which is **ordered (3.7 version onward)**, **changeable** and **does not allow duplicates**. Dictionaries are written with curly brackets, and have keys and values.
e.g. thisdict = {"brand": "Ford", "model": "Mustang", "year": 1964}

Dictionary Methods

Python has a set of built-in methods that you can use on dictionaries.

Method	Description
D.clear()	Removes all the elements from the dictionary
D.copy()	Returns a copy of the dictionary
D.get(k)	Returns the value of the specified key
D.items()	Returns a list containing a tuple for each key value pair
D.keys()	Returns a list containing the dictionary's keys
D.pop(k)	Removes the element with the specified key
D.popitem()	Removes the last inserted key-value pair
D.setdefault(k,v)	Returns the value of the specified key. If the key does not exist: insert the key, with the specified value
D.update({k:v})	Updates the dictionary with the specified key-value pairs
D.values()	Returns a list of all the values in the dictionary

Problem Definition:

1. In below table input variable, python code and output column is given. You have to complete blank cell in every row.

List		
Input	**Python Code**	**Output**
thislist=["apple","banana","cherry","orange","kiwi","melon","mango"]	print(len(thislist)) print(type(thislist)) print(thislist[1]) print(thislist[-1]) print(thislist[2:5]) print(thislist[:4]) print(thislist[2:])	7 <class 'list'> banana mango ['cherry', 'orange', 'kiwi'] ['apple', 'banana', 'cherry', 'orange'] ['cherry', 'orange', 'kiwi', 'melon', 'mango']

thislist = ["orange", "mango", "kiwi", "pineapple", "apple"]	if "apple" in thislist:
	    print("Yes, 'apple' is in the fruits list")
	for x in thislist:
	    print(x)
	for i in range(len(thislist)):
		Yes, 'apple' is in the fruits list
		orange
		mango
		kiwi

Input	Python Code	Output
	print(thislist[i]) thislist.sort() print(thislist)	pineapple apple orange mango kiwi pineapple apple ['apple', 'kiwi', 'mango', 'orange', 'pineapple']
Thislist=["apple","banana","cherry"]	Thislist.pop() Thislist.pop() Thislist.append('blackcurrant') Thislist.append('cherry') print(thislist)	['apple','blackcurrant','cherry']
thislist=["apple", "banana", "cherry"]	thislist=["apple", "banana", "cherry"] thislist.insert(2,"watermelon") print(thislist)	['apple','banana','watermelon', 'cherry']
thislist=["apple","banana","cherry"]	thislist.append("orange") print(thislist)	thislist=["apple","banana","cherry",”orange”]
thislist=["apple", "banana", "cherry"] tropical=["mango", "pineapple"]	thislist.extend(tropical) print(thislist)	thislist=["apple","banana","cherry",”mango”,”pineapple”]
thislist = ["apple", "banana", "cherry"]	thislist.remove(“banana”)	['apple', 'cherry']
thislist = ["apple", "banana", "cherry"]	del thislist print(thislist)	Traceback (most recent call last): File "main.py", line 3, in <module> print(thislist) NameError: name 'thislist' is not defined
thislist = ["apple", "banana", "cherry"]	thislist.clear() print(thislist)	[]
thislist = ["apple", "banana", "cherry"]	x=thislist y= thislist.copy() thislist.clear() print(x) print(y)	[] ['apple', 'banana', 'cherry']
list1 = [5, 6, 7] list2 = [1, 2, 3]	list3 = list1 + list2 print(list3)	[5,6,7,1,2,3]

Tuple		
Input	**Python Code**	**Output**
x = ("apple",) y = ("apple")	print(type(x)) print(type(y))	<class 'tuple'> <class 'str'>

thistuple=("apple","banana","cherry")	print(thistuple[-1])	?
x = ("apple", "banana", "cherry")	x[1] = "kiwi" print(x)	Traceback (most recent call last): File "main.py", line 2, in <module> x[1] = "kiwi" TypeError: 'tuple' object does not support item assignment
x = ("apple", "banana", "cherry")	y = list(x) y[1] = "kiwi" x = tuple(y) print(x)	('apple', 'kiwi', 'cherry')
fruits = ("apple", "banana", "cherry", "strawberry", "raspberry")	(green, yellow, *red) = fruits print(green) print(yellow) print(red) print(type(red))	apple banana ['cherry', 'strawberry', 'raspberry'] <class 'list'>
fruits = ("apple", "banana", "cherry")	mytuple = fruits * 2 print(mytuple.count("apple")) print(mytuple.index("banana"))	apple banana ['cherry', 'strawberry', 'raspberry'] <class 'list'>

Set		
Input	**Python Code**	**Output**

myset = {"abc", 34, True, 40.5}	print(myset) print(len(myset)) print(type(myset)) print(34 in thisset) myset.add("orange") print(myset)	{40.5, True, 34, 'abc'} 4 <class 'set'> Traceback (most recent call last): File "main.py", line 5, in <module> print(34 in thisset) NameError: name 'thisset' is not defined
thisset = {"apple", "mango", "cherry"} tropical={"papaya", "mango"}	thisset=thisset+tropical print(thisset)	Traceback (most recent call last): File "main.py", line 3, in <module> thisset=thisset+tropical TypeError: unsupported operand type(s) for +: 'set' and

		'set'
	thisset.update(tropical) print(thisset)	{'apple', 'mango', 'papaya', 'cherry'}
	thisset.intersection_update (tropical) print(thisset)	{'mango'}
	thisset.symmetric_difference_up date(tropical) print(thisset)	{'apple', 'cherry', 'papaya'}

Dictionaries		
Input	**Python Code**	**Output**
thisdict={"brand":"Ford","model": "Mustang","year": 1964 year": 2020}, "	print(thisdict) print(type(thisdict)) print(len(thisdict)) print(thisdict["brand"]) print(thisdict["year"]) x = thisdict.get("model") print(x) y = thisdict.keys() print(y) z = thisdict.values() print(z) thisdict["color"] = "white" print(thisdict) if "model" in thisdict: print("Yes")	{'brand': 'Ford', 'model': 'Mustang', 'year': 2020} <class 'dict'> 3 Ford 2020 Mustang dict_keys(['brand', 'model', 'year']) dict_values(['Ford', 'Mustang', 2020]) {'brand': 'Ford', 'model': 'Mustang', 'year': 2020, 'color': 'white'} Yes
	thisdict["year"] = 2018 print(thisdict)	{'brand': 'Ford',

		'model': 'Mustang', 'year': 2018}
	thisdict.pop("model") print(thisdict)	{'brand': 'Ford', 'year': 2020}{'brand': 'Ford', 'year': 2020}

	for x in thisdict:
	   print(x)
	   print(thisdict[x])
		brand
		Ford
		model
		Mustang
		year
		2020

	for x, y in thisdict.items(): print(x, y)	brand Ford model Mustang year 2020

2. Write a python program to take list values as input parameters and returns another list without any duplicates.

3. Write a program that takes a string as input from user and computes the frequency of each letters. Use a variable of dictionary type to maintain the count.

Books/ Journals/ Websites referred:

1. Reema Thareja, *Python Programming: Using Problem Solving Approach*, Oxford University Press, First Edition 2017, India
2. Sheetal Taneja and Naveen Kumar, *Python Programming: A modular Approach*, Pearson India, Second Edition 2018,India
3. https://github.com/Aatmaj-Zephyr/Learning-Python

Implementation details:

```
'''
Write a python program to take list values as input parameters and returns another list
without any duplicates.
'''

print(list(set(input("Please enter a list elements seperated by commas ").split(","))))
```

'''Explanation
input()
take input

.split(",")
Split by commas

set()
convert into a set

list()
convert to a list

'''

'''
Write a program that takes a string as input from user and computes the frequency of each letters. Use a variable of dictionary type to maintain the count.'''

```python
value=input("Please enter a valid string ") #accept value from user
a={} #make empty tuple
for i in value:
    try:#if value already in dictionary
     a[i]+=1 #add count
    except KeyError: #If value not present already
        a[i]=1 # set value 1
print(a)
```

Output(s):

Please enter a list elements seperated by commas 1,2,3,1,4,2,2,5,6
['5', '3', '4', '2', '6', '1']

Please enter a valid string pokemon
{'p': 1, 'o': 2, 'k': 1, 'e': 1, 'm': 1, 'n': 1}

Conclusion:

Thus we have now understood the working of data structures in Python. We understood the working of tuples, lists, dictionaries and sets. We have successfully implemented the various functions on these data structures and implemented small programs.

Post Lab Descriptive Questions
　　1. List out Mutable and Immutable Data Types in Python.
Mutable data structures- lists and dictionaries.

Non mutable data structures is tuples.

2. What do you mean by indexed and ordered data type in python?

Indexed data types like lists or tuples have values stored in logical groups with numerical ordering. On the other hand ordered data types like dictionaries have data stored in ordered key-value pairs. These values are not in any numerical order, but are values bundled together.

Date: 4-18-2022   **Signature of faculty in-charge**