

Practical - 4

Aim:

Understand the lists and tuples data structures and operations.

Q1: Explain difference between insert, append and extend operations on list. Write a program to create and initialize a list with your name, enrollment number, age, branch and result. Perform insert, remove, update, append and extend operation on list.

Code:

```
student = ["Vatsal", "24012011142", 21, "CE", 9.11]
print(student)
student.insert(1,"Patel")
print(student)
student.remove(21)
print(student)
student[4] = 8.49
print(student)
```

Output:

```
['Vatsal', '24012011142', 21, 'CE', 9.11]
['Vatsal', 'Patel', '24012011142', 21, 'CE', 9.11]
['Vatsal', 'Patel', '24012011142', 'CE', 9.11]
['Vatsal', 'Patel', '24012011142', 'CE', 8.49]
```

Q2: Write a program to search an element, find maximum & minimum value from the list.

- Using inbuilt function
- Using for loop

Code:

```
l = [1,6,8,3,8,2,9,2,6]
minimum = min(l)
maximun = max(l)

print(f"""
Using In-Built Methods:
Minimum: {minimum}
Maximum: {maximun}
""")
```

```
l = [1,6,8,3,8,2,9,2,6]
minimum = float('inf')
maximun = float('-inf')

for i in l:
    if i > maximun:
        maximun = i
    if i < minimum:
        minimum = i

print(f"""
Using Loop:
Minimum: {minimum}
Maximum: {maximun}
""")
```

Output:

Using In-Built Methods:

Minimum: 1

Maximum: 9

Using Loop:

Minimum: 1

Maximum: 9

Q3: Create a program that asks the user for a number and then prints out a list of all the divisors of that number.

Code:

```
num = int(input("Enter Number You want Divisor Of: "))
divisor_list = []
for i in range(1,num + 1):
    if num % i == 0:
```

```

    divisor_list.append(i)

print(divisor_list)

```

Output:

```

Enter Number You want Divisor Of: 15
[1, 3, 5, 15]

```

Q4: Write a program to sort element in list

- In same list
- Create sorted copy of original list & print both.
- Sort without any built-in function

Code:

```

# in same List
l = [1,6,8,3,8,2,9,2,6]
print("1. in same List")
l.sort()
print("list :", l)

# Make Sorted Copy
l = [1,6,8,3,8,2,9,2,6]
print("2. Sorted Copy")
print("list :", l)
l1 = sorted(l)
print("list1 :", l1)

# without Any Builtin Function
for i in range(len(l)):
    for j in range(len(l)):
        if l[j] > l[i]:
            temp = l[i]
            l[i] = l[j]
            l[j] = temp

print("3. without Any Builtin Function")
print("list :", l)

```

Output:

```

1. in same List
list : [1, 2, 2, 3, 6, 6, 8, 8, 9]
2. Sorted Copy
list : [1, 6, 8, 3, 8, 2, 9, 2, 6]

```

```
list1 : [1, 2, 2, 3, 6, 6, 8, 8, 9]
```

3. without Any Builtin Function

```
list : [1, 2, 2, 3, 6, 6, 8, 8, 9]
```

Q5: Take two lists, say for example these two:

- a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]
- b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]

and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.

Code:

```
a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]
b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]
common_elements = set()

for i in a:
    if i in b:
        common_elements.add(i)

print(f"""
Common Elements: {common_elements}
""")
```

Output:

```
Common Elements: {1, 2, 3, 5, 8, 13}
```

Q6: Write a Python program which takes a list and returns a list with the elements "Shifted left by one position" so [1, 2, 3] yields [2, 3, 1]. Example: [11, 12, 13] → [12, 13, 11]

Code:

```
l = [1,2,3,4,5]
l = l[1:] + l[:1]
print("Method1:",l)

# Another Method
l = [1,2,3,4,5]
temp = l.pop(0)
l.append(temp)
print("Method2:",l)
```

Output:

```
Method1: [2, 3, 4, 5, 1]
```

```
Method2: [2, 3, 4, 5, 1]
```

Q7: Write a program which takes a comma separated string from user & store each string which separated by comma in list & display list.

Code:

```
# String: Hii,My,Name,Is,Vatsal
st = input("Enter String: ")
l = st.split(",")
print(l)
```

Output:

```
Enter String: Hii,My,Name,Is,Vatsal
['Hii', 'My', 'Name', 'Is', 'Vatsal']
```

Q8: Write a program to create and initialize the tuple. Also remove 3rd element from tuple.

Code:

```
user = ("Vatsal", "Patel", 21, "Himmatnagar")
user1 = list(user)
user1.pop(2)
user1 = tuple(user1)
print(f"""
Original Tuple: {user}
Modified Tuple: {user1}
""")
```

Output:

```
Original Tuple: ('Vatsal', 'Patel', 21, 'Himmatnagar')
Modified Tuple: ('Vatsal', 'Patel', 'Himmatnagar')
```

Q9: Create a tuple with name courses and initialize it with JAVA, PHP, C#, Android. Insert two items HTML and Python at the 3rd position in tuple.

Code:

```
l = ('JAVA', 'PHP', 'C#', 'Android')
l = list(l)
l[3:3] = ['HTML', 'Python']
l = tuple(l)
print(l)
```

Output:

```
('JAVA', 'PHP', 'C#', 'HTML', 'Python', 'Android')
```

Q10: Write a python program which shows the effect of mutability.

Code:

```
my_list = [1, 2, 3]
original_id = id(my_list)
print(f"Original List: {my_list} | ID: {original_id}")

# Modifying the list in place
my_list.append(4)
new_id = id(my_list)
print(f"Modified List: {my_list} | ID: {new_id}")
print(f"IDs are the same: {original_id == new_id} (Same object in memory)")
```

Output:

```
Original List: [1, 2, 3] | ID: 138533525644672
Modified List: [1, 2, 3, 4] | ID: 138533525644672
IDs are the same: True (Same object in memory)
```

Q11: Write a program to create a regular expression which verifies whether given mobile number is valid or not.

Code:

```
import re
phoneNumberRegex = re.compile(r"^[6-9]\d{9}$")

phoneNumber = "9409361272"

if phoneNumberRegex.search(phoneNumber):
    print("Valid Number")
else:
    print("Invalid Number")
```

Output:

```
Valid Number
```

Practice Exercise:

1. Write a program that takes a list of student scores [85, 92, 78, 65, 90, 76, 88, 79] and performs the following operations:

- Create a new list with only scores above 80
- Find average score using for loop (without built-in functions)
- Sort scores in descending order without using built-in functions

Display all results.

Code:

```
l = [85, 92, 78, 65, 90, 76, 88, 79]
score_above_80 = []

for i in l:
    if i > 80:
        score_above_80.append(i)

sum = 0
n = 0
for i in l:
    sum += i
    n += 1
avarage = sum / n

for i in range(n):
    for j in range(n):
        if l[i] > l[j]:
            temp = l[i]
            l[i] = l[j]
            l[j] = temp

print(f"""
Score Above 80: {score_above_80}
Avarage: {avarage}
Sorted List: {l}
""")
```

Output:

```
Score Above 80: [85, 92, 90, 88]
Avarage: 81.625
Sorted List: [92, 90, 88, 85, 79, 78, 76, 65]
```

2. Create a program that maintains two lists:

- `products = ['Laptop', 'Mouse', 'Keyboard', 'Monitor']`
- `prices = [45000, 890, 920, 15600]`
- Perform following operations:
- Insert new product with price at position 2
- Remove product 'Mouse' and its corresponding price
- Update price of 'Monitor'
- Display products with prices > 1000

Code:

```
products = ['Laptop', 'Mouse', 'Keyboard', 'Monitor']
prices = [45000, 890, 920, 15600]
```

```
# Task 1
```

```
products.insert(2, "Printer")
```

```
prices.insert(2, 5200)
```

```
print(f"""
```

```
Lists After Task 1:
```

```
Products: {products}
```

```
Prices: {prices}
```

```
""")
```

```
# Task 2
```

```
idx_mouse = products.index("Mouse")
```

```
products.pop(idx_mouse)
```

```
prices.pop(idx_mouse)
```

```
print(f"""
```

```
Lists After Task 2:
```

```
Products: {products}
```

```
Prices: {prices}
```

```
""")
```

```
# Task 3
```

```
prices[products.index("Monitor")] = 20600
```

```
print(f"""
Lists After Task 3:
Products: {products}
Prices: {prices}
""")

# Task 4
prices_above_1000 = []
products_above_1000 = []
for i in range(len(prices)):
    if prices[i] > 1000:
        prices_above_1000.append(prices[i])
        products_above_1000.append(products[i])

print(f"""
Lists After Task 4:
Products Above 1000: {products_above_1000}
Prices Above 1000: {prices_above_1000}
""")
```

Output:

```
Lists After Task 1:
Products: ['Laptop', 'Mouse', 'Printer', 'Keyboard', 'Monitor']
Prices: [45000, 890, 5200, 920, 15600]
```

```
Lists After Task 2:
Products: ['Laptop', 'Printer', 'Keyboard', 'Monitor']
Prices: [45000, 5200, 920, 15600]
```

```
Lists After Task 3:
Products: ['Laptop', 'Printer', 'Keyboard', 'Monitor']
Prices: [45000, 5200, 920, 20600]
```

```
Lists After Task 4:
Products Above 1000: ['Laptop', 'Printer', 'Monitor']
Prices Above 1000: [45000, 5200, 20600]
```

3. Write a program that takes a tuple of subject marks (Python, Java, SQL, HTML) and performs:

- Convert tuple to list
- Add two new subjects with marks
- Remove lowest mark subject
- Convert back to tuple

Display original and final tuple

Code:

```
sub = ('Python', 'Java', 'SQL', 'HTML')
marks = (100, 90, 95, 98)
```

```
# Convert Into List
sub = list(sub)
marks = list(marks)
```

```
# Add 2 Subject with marks
sub.append("C")
marks.append(94)
sub.append("OS")
marks.append(92)
```

```
# Remove Lowest Marks
sub.pop(marks.index(min(marks)))
marks.pop(marks.index(min(marks)))
```

```
# Convert Back in Tuple
```

```
sub = tuple(sub)
marks = tuple(marks)
```

```
print(f"""
Subjects: {sub}
Marks: {marks}
""")
```

Output:

Subjects: ('Python', 'SQL', 'HTML', 'C', 'OS')

Marks: (100, 95, 98, 94, 92)

4. Create a program that takes a list of words and generates:

- A list containing length of each word
- A list of words with odd number of characters
- A list of words starting with vowels
- All operations should be done without built-in functions (except len())

Code:

```
# st = input("Enter List with Comma Separated: ")
st = 'Hii,My,Name,is,Vatsal,And,I,am,doing,Computer,Engineering'
st = st.split(",")
length = []
odd_words = []
words_starting_with_vowels = []
vowels = ['a', 'e', 'i', 'o', 'u']

for i in st:
    length.append(len(i))
    if len(i) % 2 != 0:
        odd_words.append(i)
    if i[0] in vowels:
        words_starting_with_vowels.append(i)

print(f"""
Length: {length}
Odd Len Words: {odd_words}
Word Starting With Vowels: {words_starting_with_vowels}
""")
```

Output:

```
Length: [3, 2, 4, 2, 6, 3, 1, 2, 5, 8, 11]
Odd Len Words: ['Hii', 'And', 'I', 'doing', 'Engineering']
Word Starting With Vowels: ['is', 'am']
```

5. Write a program that works with two lists: cities = ['Ahmedabad', 'Mumbai', 'Delhi', 'Bangalore']

codes = ['AMD', 'BOM', 'DEL', 'BLR']

- Create a comma-separated string from cities list
- Split it back into a new list
- Compare original and new list
- Create a tuple combining city and its code

Display all intermediate results

Code:

```
cities = ['Ahmedabad', 'Mumbai', 'Delhi', 'Bangalore']
codes = ['AMD', 'BOM', 'DEL', 'BLR']

comma_sparated_string_cities = ",".join(cities)
comma_sparated_string_codes = ",".join(codes)

print(f"""
String Cities: {comma_sparated_string_cities}
String Codes: {comma_sparated_string_codes}
""")

new_cities = comma_sparated_string_cities.split(",")
new_codes = comma_sparated_string_codes.split(",")

print(f"""
Original Cities List: {cities}
Modified Cities List: {new_cities}
Original Codes List: {codes}
Modified Codes List: {new_codes}
""")

tuple_list_cities = []

for i in range(len(codes)):
    tuple_list_cities.append((cities[i], codes[i]))

tuple_list_cities = tuple(tuple_list_cities)

print(f"Tuple Of Cities And Codes: {tuple_list_cities}")
```

Output:

String Cities: Ahmedabad,Mumbai,Delhi,Bangalore
String Codes: AMD,BOM,DEL,BLR

Original Cities List: ['Ahmedabad', 'Mumbai', 'Delhi', 'Bangalore']
Modified Cities List: ['Ahmedabad', 'Mumbai', 'Delhi', 'Bangalore']

```
Original Codes List: ['AMD', 'BOM', 'DEL', 'BLR']
```

```
Modified Codes List: ['AMD', 'BOM', 'DEL', 'BLR']
```

```
Tuple Of Cities And Codes: (('Ahmedabad', 'AMD'), ('Mumbai', 'BOM'),  
('Delhi', 'DEL'), ('Bangalore', 'BLR'))
```