K. J. Somaiya College of Engineering, Mumbai-77

Batch: C4(01)	Roll No.: 16010124224
Experiment / assignment / tutorial No	
Grade: AA / AB / BB / BC / CC / CD /DD	
Signature of the Staff In-charge with date	

TITLE: Write a program to demonstrate lambda, map, and filter functions in Python

AIM: 1) Write a Python program that uses lambda with filter() to select even numbers and map() to square them, displaying the original, filtered, and squared lists.
2) Write a Python program that generates a list of Pythagorean triplets (a, b, c) from a given list of integers, using lambda, filter(), and map(). The program should filter out invalid triplets and display valid ones.

OUTCOME: Students will be able to
CO1: Formulate a problem statement and develop the logic (algorithm/flowchart) for its solution.
CO3: Use different Decision-Making statements and Functions in Python.

Resource Needed: Python IDE

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://www.geeksforgeeks.org/python-strings/?ref=lbp

Theory:

Lambda function :

- A lambda function is a small anonymous function.
- A lambda function can take any number of arguments but have only one expression.
- Syntax

lambda *arguments* : *expression*

map() function returns a map object(which is an iterator) of the results after applying the given function to each item of a given iterable (list, tuple, etc.)

Syntax *: map(fun, iter)*
Parameters:

- ***fun:*** *It is a function to which a map passes each element of a given iterable.*
- ***iter:*** *It is iterable which is to be mapped.*

The filter() function returns an iterator where the items are filtered through a function to test whether the item is accepted.
Syntax:
filter(*function*, *iterable*)

function	A Function to be run for each item in the iterable
iterable	The iterable to be filtered

Problem Definition:
1.In the below table, the input variable, Python code, and output column is given. You have to complete a blank cell in every row.

Python Code	Output
x = lambda a : a + 10 print(x(5))	15
x = lambda a, b : a * b print(x(5, 6))	30
def myfunc(n): return lambda a : a * n mydoubler = myfunc(2) print(mydoubler(11))	22
def addition(n): **return** n + n numbers = (1, 2, 3, 4) result = map(addition, numbers) print(list(result))	[2, 4, 6, 8]

numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10] evens = list(filter(lambda x: x % 2 == 0, numbers)) print(evens)	[2, 4, 6, 8, 10]
square = lambda x: x ** 2 result = square(4) print(result)	16
chars = ['a', 'b', 'e', 'i', 'o', 'u', 'z'] vowels = list(filter(lambda x: x in 'aeiou', chars)) print(vowels)	['a', 'e', 'i', 'o', 'u']

2) Write a Python program that uses lambda with filter() to select even numbers and map() to square them, displaying the original, filtered, and squared lists.

3) Write a Python program that generates a list of Pythagorean triplets (a, b, c) from a given list of integers, using lambda, filter(), and map(). The program should filter out invalid triplets and display valid ones.

Implementation details:

Q2)

```
1   nums = [1, 7, 3, 5, 6, 12, 8, 4, 10]
2
3   evennums = list(filter(lambda x: x % 2 == 0, nums))
4   sqrEvenNums = list(map(lambda x: x ** 2, evennums))
5
6   print("Original list:", nums)
7
8   print("Filtered even numbers:", evennums)
9
10  print("Squared even numbers:", sqrEvenNums)
```

Q3)

```python
nums = [3, 4, 5, 6, 9, 10, 11, 20, 21, 29, 13, 8, 12, 35, 77, 37]
t = []
for a in nums:
    for b in nums:
        for c in nums:
            if a < b < c and a**2 + b**2 == c**2:
                t.append((a, b, c))
print("Pythagorean triplets:", t)
```

Output(s):

Q2)

```
Original list: [1, 7, 3, 5, 6, 12, 8, 4, 10]
Filtered even numbers: [6, 12, 8, 4, 10]
```

Q3)

```
Pythagorean triplets: [(3, 4, 5), (5, 12, 13), (6, 8, 10), (20, 21, 29), (12, 35, 37)]
```

Conclusion:

In this exercise, we demonstrated the use of Python's **'lambda'**, **'map'**, and **'filter'** functions to process data. The first program selected and squared even numbers from the given list, while the second program generated valid Pythagorean triplets.

Post Lab Descriptive Questions

1. Explain the following built-in functions of python

1.abs():

Returns the absolute value of a number

2.max()

Returns the maximum value of given parameters

3.exec()
Used for the dynamic execution of the program
4.range()
Generate a sequence of numbers

2. **Explain the difference between user-defined function and built-in function**

User-Defined function: The function which performs task according to user's need is known as user-defined function.

Built-In function: The pre defined functions which are already presents in the python library.