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

Batch:C5	**Roll No.:25**
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 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 can only have 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 map passes each element of 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 if the item is accepted or not.
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:

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.
INPUT:

```
numbers=[1,2,3,4,5,6,7,8,9,10]
print(numbers)
x=lambda a:a%2==0
even=list(filter(x,numbers))
print(even)
sq=lambda a:a*a
square=list(map(sq,even))
print(square)
```

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.

INPUT:

```
from itertools import combinations
n=[8,7,6,3,4,5,2,9,10,11,12,13,14]
comb=list(combinations(n,3))
sorted_comb=list(map(lambda triplets:tuple(sorted(triplets)),comb))
trips=list(filter(lambda                sorted_comb                :
sorted_comb[0]**2+sorted_comb[1]**2==sorted_comb[2]**2,sorted_comb)
)
print("the valid triplets are",sorted(trips))
```

Output(s):

2)

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
[2, 4, 6, 8, 10]
[4, 16, 36, 64, 100]
```

3)

```
the valid triplets are [(3, 4, 5), (5, 12, 13), (6, 8, 10)]
```

Conclusion:

Post Lab Descriptive Questions

1. **Explain following built in function of python**
   1.abs()
   2.max()
   3.exec()
   4.range()

ANS.

abs():It returns the absolute value of the argument

max():It returns the largest item in an iterable or the largest of two or more arguments.

exec(): It executes the Python code dynamically, which can be a string or object code.

range(): It generates a sequence of numbers. Commonly used in loops.

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

ANS.

Built-in Functions

- **Definition**: These are functions that are pre-defined and provided by Python, available for immediate use without any need for user definition or import.

- **Purpose**: To perform common tasks like mathematical operations, type conversions, I/O operations, etc.
- **Availability**: Automatically available in every Python environment.
- **Examples**:
  - abs(), max(), range(), exec()
- **Usage**: You can call these functions directly without defining them

User-defined Functions

- **Definition**: These are functions created by the user to perform specific tasks that are not covered by built-in functions. You define them using the `def` keyword.
- **Purpose**: To encapsulate reusable blocks of code to perform specific tasks that the user wants.
- **Availability**: Available only after you define them explicitly in your code.