

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

Batch: C-5(3) Roll No.: 55
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

Department of Department of Science and Humanities

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

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)`

<i>function</i>	A Function to be run for each item in the iterable
<i>iterable</i>	The iterable to be filtered

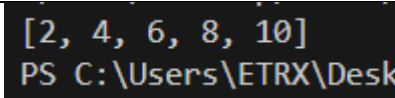
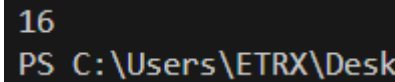
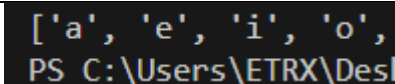
Problem Definition:

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
<code>x = lambda a : a + 10 print(x(5))</code>	15 PS C:\Users\ETRX\Desktop\acv93>
<code>x = lambda a, b : a * b print(x(5, 6))</code>	30 PS C:\Users\ETRX\Desktop\ac
<code>def myfunc(n): return lambda a : a * n mydoubler = myfunc(2) print(mydoubler(11))</code>	22 PS C:\Users\ETRX\Des
<code>def addition(n): return n + n numbers = (1, 2, 3, 4) result = map(addition, numbers)</code>	[2, 4, 6, 8] PS C:\Users\ETRX\Desk

Department of Department of Science and Humanities

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

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

- 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:

```
# QUESTION 2
num = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
even_num = list(filter(lambda x: x % 2 == 0, num))
sq_num = list(map(lambda x: x ** 2, even_num))
print("Original list:", num)
print("Filtered list (even numbers):", even_num)
print("Squared list:", sq_num)
```

```
# Creating a list of numbers
# Using filter and lambda function
# Using map and lambda function
# Print list
# Print even numbers
# Print squared numbers
```

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

```
# Question 3
p = [1,2,3,4,5,6,7,8,9,10,11,12,13,14,]
lets = [(a,b,c) for a in p for b in p for c in p if a<b<c ]
PT = lambda triplet: triplet[0]**2 + triplet[1]**2 == triplet[2]**2
valid = filter(PT , lets)
result = list (valid)
print (" Pythagoras Triplets = " , result)
```

Output(s):

```
Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
Filtered list (even numbers): [2, 4, 6, 8, 10]
Squared list: [4, 16, 36, 64, 100]
PS C:\Users\ETRX\Desktop\acv93>
```

```
Pythagoras Triplets = [(3, 4, 5), (5, 12, 13), (6, 8, 10)]
PS C:\Users\ETRX\Desktop\acv93>
```

Conclusion:

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

Post Lab Descriptive Questions

1. Explain the following built-in functions of python

1.abs()

Ans: *This function in python is used to get absolute value or magnitude of a number.*

2.max()

Ans: *This function returns the highest or maximum value.*

3.exec()

Ans: *This function replaces the program in current process with a new program.*

4.range()

Ans: *This function returns a sequence or series of numbers in the given range.*

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

Ans: USER DEFINED FUNCTIONS

- *Those functions which are defined by programmers according to their need.*
- *These functions can be modified by user.*

BUILT IN FUNCTIONS

- *These functions are already defined.*
- *These functions cannot be modified by the user.*