

MODULE 3

- 3.1 If statement: if, if-else, elif, Nested if, pass statement
- 3.2 Repetition using While loop, for loop & range function, break, continue and pass statement
- 3.3 Defining a Function, Checking & Setting Parameters, Types of arguments: required arguments, Keyword arguments, Default arguments, Variable-length arguments
- 3.4 Pass statement in function, Nested Functions, Scope of variables
- 3.5 Recursion, Lambda and Filter, Map

Q No	Question			
1	<p>You are given a list of integers. Write a Python program that rearranges the list based on a specific pattern. The pattern is as follows: All even elements should come before all odd elements, and within even and odd elements, they should be sorted in ascending order.</p> <p>Test case: Suppose you have the following list of integers:</p> <p>Input:3 8 2 5 10 6 4 9</p> <p>Output: 2 4 6 8 10 3 5 9</p>			
2	<p>Write a Python program to calculate the grade of a student based on the total marks scored in 5 subjects and determine if the student is eligible for a scholarship. The program should take the student's marks in 5 subjects as input.</p> <p>Scholarship eligibility criteria: The average score should be 85 or above for eligibility. If the score is between 75 and 85, they should be on a waiting list. If the score is below 75, the student is not eligible.</p> <p>The program should include a function to calculate the average of the marks. Students should also make use of a <i>pass</i> statement in one of the conditions.</p> <table><tr><td>Test case1: Input: 92, 88, 79, 85, 90 Output: Average: 86.8 Eligible for Scholarship</td><td>Test case2: Input: 80, 75, 78, 82, 70 Output: Average: 77.0 Waiting List</td><td>Test case3: Input: 60, 68, 72, 65, 70 Output: Average: 67.0 Not Eligible</td></tr></table>	Test case1: Input: 92, 88, 79, 85, 90 Output: Average: 86.8 Eligible for Scholarship	Test case2: Input: 80, 75, 78, 82, 70 Output: Average: 77.0 Waiting List	Test case3: Input: 60, 68, 72, 65, 70 Output: Average: 67.0 Not Eligible
Test case1: Input: 92, 88, 79, 85, 90 Output: Average: 86.8 Eligible for Scholarship	Test case2: Input: 80, 75, 78, 82, 70 Output: Average: 77.0 Waiting List	Test case3: Input: 60, 68, 72, 65, 70 Output: Average: 67.0 Not Eligible		
3	<p>Write a function login(username, password) that checks if both the username and password meet certain conditions (e.g., username must be alphanumeric, password must be at least 8 characters). Display appropriate error messages if the inputs don't meet the</p>			

	<p>criteria. set inputs as, Username="user123" and password="password456"</p> <table><tr><td>Test case1: Enter Username: user123 Enter Password: password456 Output: Login Successful</td><td>Test case1: Enter Username: user123 Enter Password: pass456 Error: Password must be at least 8 characters long</td><td>Test case1: Enter Username: user_123 Enter Password: password456 Error: Username must be alphanumeric</td></tr></table>	Test case1: Enter Username: user123 Enter Password: password456 Output: Login Successful	Test case1: Enter Username: user123 Enter Password: pass456 Error: Password must be at least 8 characters long	Test case1: Enter Username: user_123 Enter Password: password456 Error: Username must be alphanumeric
Test case1: Enter Username: user123 Enter Password: password456 Output: Login Successful	Test case1: Enter Username: user123 Enter Password: pass456 Error: Password must be at least 8 characters long	Test case1: Enter Username: user_123 Enter Password: password456 Error: Username must be alphanumeric		
4	Write a program that asks the user for a range of numbers and then counts how many of those numbers are even and how many are odd.			
5	<p>Write a Python program that takes a list of dictionaries, where each dictionary represents a student with their name and scores in various subjects. The program should return a new dictionary where each key is a student's name, and the value is their average score across all subjects. (Using Function)</p> <p>Sample List:</p> <pre>students = [{'name': 'Arjun', 'math': 85, 'science': 90, 'english': 78}, {'name': 'Balram', 'math': 92, 'science': 88, 'english': 84}, {'name': 'Damodar', 'math': 72, 'science': 75, 'english': 80}]</pre> <p>Expected Result:</p> <pre>{'Alice': 84.33, 'Bob': 88.0, 'Charlie': 75.67}</pre>			
6	Write a program to generate calender of a month given the start_day and the number of days in that month.			
7	<p>Write a recursive function to calculate the factorial of a number.</p> <p>Sample Input: 5 Expected Output: 120</p>			
8	<p>Write a program to print the following pattern.</p> <pre>* * * * * *</pre>			

	<pre>* * * * * * * * * * * * * * * * * * * </pre>				
9	<p>Write a python program to accept a coordinate point in a XY coordinate system and determine in which quadrant/axis the coordinate point lies.</p> <table><tr><td>Test Case 1: Input: 7,8 Output: First quadrant</td><td>Test Case 2: Input: 0,0 Output: Origin</td><td>Test Case 3: Input: -7, 0 Output: X-axis</td><td>Test Case 4: Input: 7,-8 Output: Fourth quadrant</td></tr></table>	Test Case 1: Input: 7,8 Output: First quadrant	Test Case 2: Input: 0,0 Output: Origin	Test Case 3: Input: -7, 0 Output: X-axis	Test Case 4: Input: 7,-8 Output: Fourth quadrant
Test Case 1: Input: 7,8 Output: First quadrant	Test Case 2: Input: 0,0 Output: Origin	Test Case 3: Input: -7, 0 Output: X-axis	Test Case 4: Input: 7,-8 Output: Fourth quadrant		
10	<p>Write a program to establish if a given integer num is a Curzon number. If $(1+2^{\text{num}})$ is exactly divisible by $(1+2*\text{num})$, then num is a Curzon number.</p> <p>Example: Input: 5 Output: True</p> <pre># 1 + 2 ** 5= 33 # 1 + 2 * 5 = 11 # 33 is a multiple of 11</pre> <table><tr><td>Test Case 1: Input: 5 Output: True</td><td>Test Case 2: Input: 10 Output: False</td><td>Test Case 3: Input: 6 Output: True</td><td>Test Case 4: Input: 4 Output: False</td></tr></table>	Test Case 1: Input: 5 Output: True	Test Case 2: Input: 10 Output: False	Test Case 3: Input: 6 Output: True	Test Case 4: Input: 4 Output: False
Test Case 1: Input: 5 Output: True	Test Case 2: Input: 10 Output: False	Test Case 3: Input: 6 Output: True	Test Case 4: Input: 4 Output: False		
11	Write a program that accepts a sentence and calculates the number of uppercase letters and lowercase letters.				
12	Write a Python program to check whether an element exists within a tuple.				
13	Write a Python program to generate and print a list of the first and last 5 elements where the values are square numbers between 1 and 30 (both included).				
14	<p>A triangle can be classified based on the lengths of its sides as equilateral, isosceles or scalene.</p> <p>All 3 sides of an equilateral triangle have the same length.</p>				

	<p>An isosceles triangle has two sides that are the same length, and a third side that is a different length. If all of the sides have different lengths then the triangle is scalene.</p> <p>Write a program that reads the lengths of 3 sides of a triangle from the user. Display a message indicating the type of the triangle and its area. (use Heron's formula)</p>
15	<p>Write a program to input a string and parse it. For every character in the string it should print one of the following:</p> <ul style="list-style-type: none"> Is a digit Is a lowercase Is an uppercase Is something else <p>(a) Do the above program using if-elif-else (b) Use match case statements</p>
16	<p>Write a Python program that takes a user's age as input and categorizes them into one of the following age groups:</p> <ul style="list-style-type: none"> • "Child" (age 0-12) • "Teenager" (age 13-19) • "Adult" (age 20-59) • "Senior" (age 60 and above) <p>If the age is less than 0 or not a number, display an error message. Implement this using if, elif, and else statements. Also, include a pass statement in your code for a category where you don't want to take any action.</p> <p>Expected Output:</p> <p>If the user inputs 8, the output will be "Child". If the user inputs 25, the output will be "Adult". If the user inputs -5, the output will be "Error: Age cannot be negative.". If the user inputs an invalid number like abc, the output will be "Error: Please enter a valid number for age."</p>
17	<p>Write a program to read a 5 digit number and then display the number in the following formats. Eg., if the user entered 12345, the result should be</p> <pre>12345 1 2345 12</pre>

	<div>345 123</div> <div>45 1234</div> <div>5 12345</div>
18	Write a Python program that prints all numbers from 1 to 20, except the multiples of 5. Use the continue statement to skip printing multiples of 5.
19	Write a Python program to check if a student has passed or failed the exams with 5 subjects. A student passes if they score at least 40 in all subjects. Additionally, if the average score is 75 or more, print "Distinction."
20	The town has 500,000 residents now. For the past ten years, the population has been growing at a steady pace of 12% annually. write a program to find out the population at the end of each year over the past ten years.
21	Write a Python program that utilizes lambda functions and the map function to manipulate a list of numbers provided by the user. Additionally, use the filter function to identify certain numbers from the list.
22	WAP to generate 10 random Unique number from 0-15
23	Write a program that prompts users to enter the numbers. The process will continue till the user enters -1. Finally, the program prints the count of prime and composite numbers entered.
24	<p>Write a Python program to remove all non-alphanumeric characters (i.e., characters that are neither letters nor digits) from a given string using regular expressions.</p> <p>Input: " Hello ! This is a test string. "</p> <p>Output: "HelloThisisateststring"</p> <p>Note: All spaces are also considered as Non-alphanumeric character.</p>
25	<p>Write a Python program to filter a list of integers using Lambda.</p> <p>Input: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]</p> <p>Output:</p> <ol style="list-style-type: none"> Even numbers: [2, 4, 6, 8, 10] Odd numbers from the said list: [1, 3, 5, 7, 9]
26	Write a function that converts a decimal number to binary number
27	<p>Write a Python program to find palindromes in a given list of strings using Lambda.</p> <p>Orginal list of strings:</p>

	['php', 'w3r', 'Python', 'abcd', 'Java', 'aaa']
28	Find all prime numbers between 1 and 50 .
29	<p>Write a Python function student_grades that takes a dictionary where the keys are student names and the values are lists of their scores in different subjects. The function should return a dictionary where each student's name is a key, and the value is their average grade, rounded to two decimal places.</p> <pre>grades = { 'Sat': [85, 90, 78], 'Chid': [92, 88, 84], 'Anand': [72, 75, 80] } print(student_grades(grades)) # Output: {'Sad': 84.33, 'Chid': 88.0, 'Anand': 75.67}</pre>
30	<p>Write a Python function square_numbers that takes a list of numbers as input and returns a list of their squares using a lambda function and the map() function.</p> <pre>print(square_numbers([1, 2, 3, 4])) # Output: [1, 4, 9, 16]</pre>
31	Write a program to sum the series $1/2 + 2/3 + \dots n/(n+1)$.
32	<p>Create a Python program that iterates over a list of numbers and prints only the even numbers, skipping the odd numbers using the continue statement.</p> <p>Sample List: [1, 2, 3, 4, 5, 6] Expected Output: 2, 4, 6</p>
33	<p>Write a Python program that takes an integer n as input and prints a hollow square pattern of size n x n using asterisks (*) and spaces. The pattern should have asterisks on the outer boundary, forming a square, while the inner cells should contain spaces.</p> <p>Test case:</p> <p>Enter the size of the hollow square: 8</p>

	<pre> * * * * * * * * * * * * * * * * * * * * * * * * </pre>
34	<p>You are given a list of dictionaries representing employee data. Each dictionary contains the following keys:</p> <p>“name”: a string representing the employee’s name.</p> <p>“age”: an integer representing the employee’s age.</p> <p>“salary”: a float representing the employee’s monthly salary.</p> <p>“department”: a string representing the employee’s department.</p> <p>Write a Python program that performs the following tasks:</p> <p>i) Create a function average_salary_by_department that takes the list of employee records and returns a dictionary where the keys are department names. The values are the average salaries of employees in each department. Calculate the average salary rounded to two decimal places.</p> <p>ii) Create a function department_with_highest_salary that takes the list of employee records and returns the department name with the highest average salary.</p> <p>iii) Create a function youngest_employee_in_department that takes the list of employee records and a department name as input. The function should return the name of the youngest employee in the specified department.</p>
35	<p>Write a Python program that processes a list of student grades. The goal is to filter out</p>

students who have passed (grades above a certain threshold), apply a curve to the passing grades using a lambda function, and then calculate the average of the curved grades using recursion.

Example:

1. Grades= 55,78,90,45,67,82,88

2. Min Mark pass=60

3. Grades after filter pass= [78, 90, 67, 82, 88]

4. Using the map function with a lambda that adds 5 to each grade:

$[78 + 5 = 83, 90 + 5 = 95, 67 + 5 = 72, 82 + 5 = 87, 88 + 5 = 93]$

Resulting in: [83, 95, 72, 87, 93]

5. Calculating Average Using Recursion: The recursive function calculates the average of the curved grades. To calculate this recursively:

First call with grades as [83, 95, 72, 87, 93]:

Sum is $(83 + (4 * \text{recursive_average}([95, 72, 87, 93]))) / 5$

Second call with grades as [95, 72, 87, 93]:

Sum is $(95 + (3 * \text{recursive_average}([72, 87, 93]))) / 4$

Third call with grades as [72, 87, 93]:

Sum is $(72 + (2 * \text{recursive_average}([87, 93]))) / 3$

Fourth call with grades as [87, 93]:

Sum is $(87 + (1 * \text{recursive_average}([93]))) / 2$

Fifth call with grades as [93]

Returns just 93.

Now we can backtrack to compute each level:

Fourth call returns $(87 + (1 * (93))) / 2 = (87 + (1 * 93)) / 2 = (180) / 2 = 90$

Third call returns $(72 + (2 * (90))) / 3 = (72 + 180) / 3 = 252 / 3 = 84$

Second call returns $(95 + (3 * (84))) / 4 = (95 + 252) / 4 = 347 / 4 = 86.75$

First call returns: $(83 + (4 * (86.75))) / 5 = (83 + 347) / 5 = 430 / 5 = 86$

Thus the final output when you run this code will be: 86

36

Write a program to check whether two circles intersect each other:

Check for all 5 cases:

(a) Circles intersect each other

(b) Circles do not intersect

	<p>(c) Circles touch at a point from outside</p> <p>(d) Circles touch at a point from inside</p> <p>(e) One circle lies inside another</p> <p>The user should give the values for r1, (x1,y1), r2, (x2, y2)</p>			
37	<p>Write a function to find the mean, median and mode of a list. (Input will be entered by user)</p> <table><tr><td><p>Test Case 1:</p><p>Input: 4 5 3 2 1 2</p><p>Output:</p><p>Mean is 2.8333</p><p>Median is 2.5</p><p>Mode is 2</p></td><td><p>Test Case 2:</p><p>Input: 4 5 3 2 1</p><p>Output:</p><p>Mean is 3</p><p>Median is 3</p><p>Mode is <No Mode></p></td><td><p>Test Case 3:</p><p>Input: 4 5 3 2 1 4 5</p><p>Output:</p><p>Mean is 3.42857</p><p>Median is 4</p><p>Mode is 4,5</p></td></tr></table>	<p>Test Case 1:</p> <p>Input: 4 5 3 2 1 2</p> <p>Output:</p> <p>Mean is 2.8333</p> <p>Median is 2.5</p> <p>Mode is 2</p>	<p>Test Case 2:</p> <p>Input: 4 5 3 2 1</p> <p>Output:</p> <p>Mean is 3</p> <p>Median is 3</p> <p>Mode is <No Mode></p>	<p>Test Case 3:</p> <p>Input: 4 5 3 2 1 4 5</p> <p>Output:</p> <p>Mean is 3.42857</p> <p>Median is 4</p> <p>Mode is 4,5</p>
<p>Test Case 1:</p> <p>Input: 4 5 3 2 1 2</p> <p>Output:</p> <p>Mean is 2.8333</p> <p>Median is 2.5</p> <p>Mode is 2</p>	<p>Test Case 2:</p> <p>Input: 4 5 3 2 1</p> <p>Output:</p> <p>Mean is 3</p> <p>Median is 3</p> <p>Mode is <No Mode></p>	<p>Test Case 3:</p> <p>Input: 4 5 3 2 1 4 5</p> <p>Output:</p> <p>Mean is 3.42857</p> <p>Median is 4</p> <p>Mode is 4,5</p>		
38				
39				
40				