NAMAL UNIVERSITY MIANWALI

DEPARTMENT OF ELECTRICAL ENGINEERING

DATA STRUCTURE AND ALGORITHM

LAB # 02

REPORT

Title : Introduction to Loops

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Date	*31-March-2023*
Marks	

Introduction :

In previous lab, we have studied the basic introduction of writing programs in Python. We have studied expressions, operators, their precedence, and control flow (if-else) statements.

Lab Objectives :

The objective of this lab is to introduce students to the loops (while and for), and functions, through programming exercises. Students will be provided with examples for each objective, followed by performing Lab Tasks and Home Tasks.

Lab Outcomes :

- The student will be able to make programs using loops.
- The student will be able to declare functions for performing specific tasks.

LAB TASKS

Task 1 : **A user wants to keep track of their expenses until they reach a certain budget limit. The user will input the amount they spent each time and the program should keep a running total of their expenses until they reach their budget limit. The program should then stop and print the total amount spent.**

CODE :

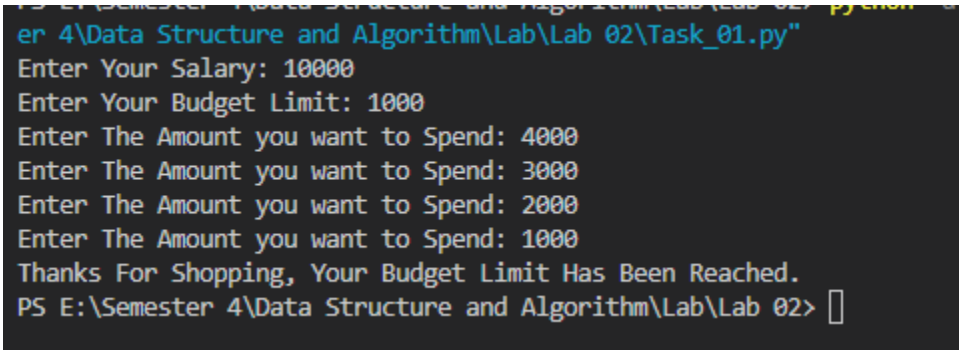
```
# User enter  salary and budget limit
salary = float(input("Enter Your Salary: "))
budget_limit = float(input("Enter Your Budget Limit: "))

#  User enter spending amounts until their remaining salary falls below
their budget limit
while salary >= budget_limit:
    spent = float(input("Enter The Amount you want to Spend: "))

    # Check if the user has enough salary to cover the spending amount
    if spent <= salary:
        salary -= spent
    else:
        # If the user does not have enough salary to cover the spending
amount, break out of the loop
        print("Sorry, Your Account Is with Low Balance.")
        break
```

```
# Once the user's remaining salary falls below their budget limit, output a
message indicating that their budget limit has been reached
print("Thanks For Shopping, Your Budget Limit Has Been Reached.")
```

Output Screen Shot:



Explanation :

In this code the user enter their salary and budget limit using **input()** function, and then take the spending money until their remaining salary falls below the budget limit. I usesd a **while()** loop to continuously request the user to enter spending amounts and subtracts the spent amount from the user's remaining salary until the remaining salary falls below the budget limit. If the user enters a spending amount that exceeds their remaining salary using **if** condition, the program prints the message and exits the loop using **break**. Once the user's remaining salary falls below the budget limit, the program prints a message indicating that their budget limit has been reached.

Task 2 : **Suppose you have to input a list of ten numbers and you want to calculate the sum of all the even numbers in the list. Make the program using for loop without index.**

CODE :

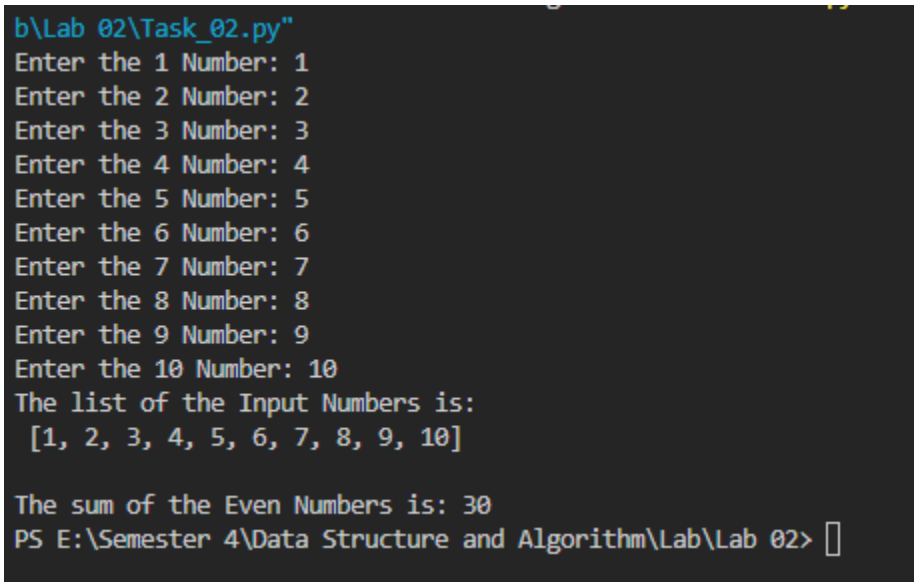
```
num_list = []           # empty list to store numbers
summ = 0                # variable to store the sum
for i in range(1,11):   # for loop to enter 10 numbers
    x = int(input(f"Enter the {i} Number: "))   # user enter the i-th number
    num_list.append(x)  # Add the number to the list of input numbers
```

```
    # if the number is even then add it to the sum
    if(x%2 == 0):
        summ += x

# Print the list of input numbers
print(f"The list of the Input Numbers is: \n {num_list}")

# Print the sum of even numbers in the list
print(f"\nThe sum of the Even Numbers is: {summ}")
```

Output Screen Shot:



Explanation :

This code repeatedly asks the user to enter 10 numbers by using a **for** loop, and each entered number is stored in a list using the **append()** method. The user is requested to enter the i-th number during each iteration of the loop, where **i ranges from 1 to 10**. After all 10 numbers have been entered, the program prints the list of **input** numbers and **sum** of the even numbers in the list using an f-string to format the output.

Task 3 : **Suppose a user wants to find the highest price from a list. Use for loop with index (using built in function range and length) in the program.**

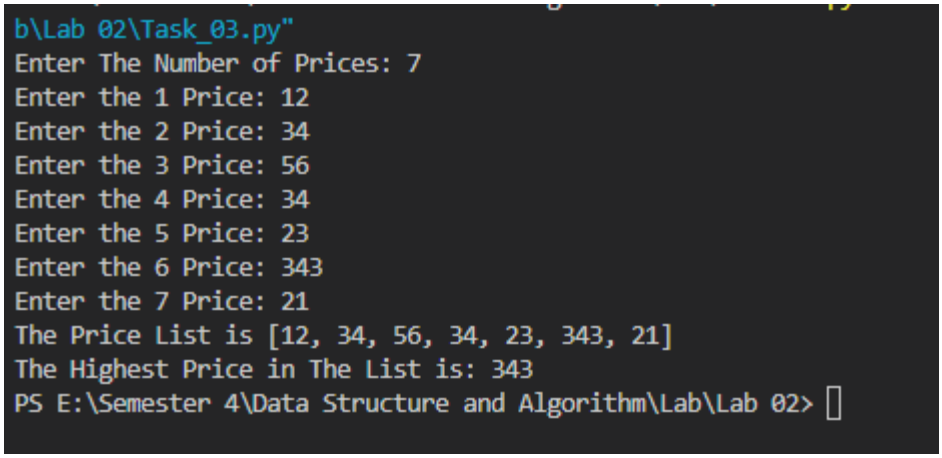
CODE :

```
# user enter the number of prices to be entered
number_of_prices = int(input("Enter The Number of Prices: "))
# Initialize an empty list to store the prices
Price_List = []
# for loop to request the user to enter each price and append it to the list
for i in range(1, number_of_prices+1):
    price = int(input(f"Enter the {i} Price: "))
    Price_List.append(price)

# Print the list of prices
print(f"The Price List is {Price_List}")

# Sort the list in descending order and print the highest price
Price_List.sort(reverse=True)
print(f"The Highest Price in The List is: {Price_List[0]}")
```

Output Screen Shot:



Explanation :

This code asks the user to enter a specified number of prices and stores them in a **list**. It then **prints** the list of prices and sorts it in **descending order** using the **sort()** method. Finally, the program prints the **highest price**, which is the **first element** of the sorted list.

Task 4 : **Write a program using function that calculates the area of rectangle. User pass the values of length and width to the function and get area in return**.

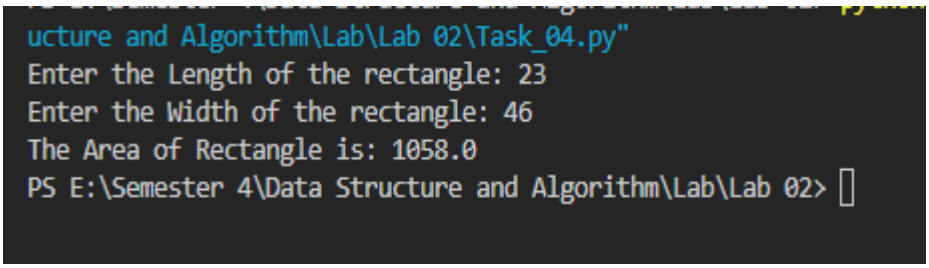
CODE :

```python
# Define a function that calculates the area of a rectangle
def Area_of_Rectangle(LENGTH: float, WIDTH: float) -> float:
    area = LENGTH * WIDTH  # Calculate the area
    return area

# Prompt the user to enter the length and width of the rectangle
len_enter = float(input("Enter the Length of the rectangle: "))
wid_enter = float(input("Enter the Width of the rectangle: "))

# Call the function to calculate the area and print the result
print(f"The Area of Rectangle is: {Area_of_Rectangle(len_enter,
wid_enter)}")
```

Output Screen Shot:



Explanation :

This code defines a function called **Area_of_Rectangle()** that calculates the area of a rectangle based on its length and width. It then asks the user to enter the length and width of a rectangle and calls the function to calculate the area, which is printed to the console using formatted string.

Task 5 : **Write a program using function with main. The function should multiply two numbers, send through main.**

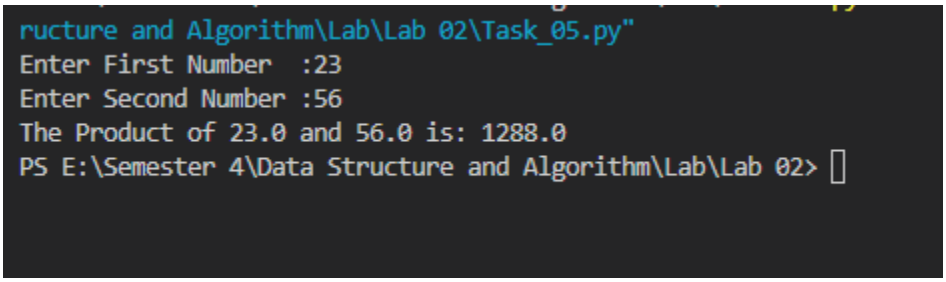
CODE :

```
# Define a function that takes in two numbers and returns their product
def Multiplication(num1:float,num2:float):
    return (num1*num2)

# Define a main function that asks the user for two numbers, calls the
Multiplication function, and prints the result
def main():
  first_num  = float(input("Enter First Number  :"))
  second_num = float(input("Enter Second Number :"))
  print(f"The Product of {first_num} and {second_num} is:
{Multiplication(first_num, second_num)}")

if __name__ =='__main__':
   main()
```

Output Screen Shot:



Explanation :

In this code I defined a function called **Multiplication()** that takes two numbers as **inputs** and **returns their product**. It also defines a **main()** function that prompts the user to enter two numbers, calls the Multiplication() function to calculate their product, and prints the result to the console. The **if __name__ =='__main__':** check at the end of the code ensures that the **main()** function is only called if the script is being run as the main program.