**Manual of code**

**Lab 4.1**

**Explanation of the Code**

This code implements the **Luhn Algorithm**, which is used to validate identification numbers such as credit card numbers. The algorithm checks if a given card number is mathematically valid by performing a series of calculations on its digits.

**How the Code Works**

**1. The LUHN Function**

The LUHN function takes a card number as input and checks if it is valid using the Luhn Algorithm. Here’s how it works:



**2. Convert the Card Number to a String**

The card number is converted to a string to make it easier to work with individual digits.



**3. Initialize the Total Sum**

A variable total is initialized to store the sum of the digits after processing them.



**4. Process Each Digit**

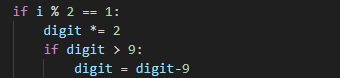
The code iterates over each digit of the card number, starting from the rightmost digit (this is why the card number is reversed using [::-1]).



* **i**: The index of the digit (starting from 0).
* **digit**: The current digit (converted to an integer).

**5. Double Every Second Digit**

For every second digit (i.e., when i % 2 == 1), the digit is doubled. If the result is a two-digit number, the digits are added together (or equivalently, 9 is subtracted).



**6. Add the Digit to the Total**

The processed digit is added to the total.



**7. Check Validity**

After processing all the digits, the function checks if the total is divisible by 10. If it is, the card number is valid.



**8. User Input and Validation**

The code prompts the user to enter a card number, calls the LUHN function to validate it, and prints the result.



**Example Walkthrough**

Let’s validate the card number 4532015112830366:

1. Reverse the number:  
   6 3 0 3 8 2 1 1 5 1 0 2 3 1 5 4
2. Double every second digit:  
   6 6 0 6 8 4 1 2 5 2 0 4 3 2 5 8
3. Adjust any two-digit results (e.g., 6 \* 2 = 12 → 1 + 2 = 3):  
   6 6 0 6 8 4 1 2 5 2 0 4 3 2 5 8
4. Sum all the digits:  
   6 + 6 + 0 + 6 + 8 + 4 + 1 + 2 + 5 + 2 + 0 + 4 + 3 + 2 + 5 + 8 = 58
5. Check if the sum is divisible by 10:  
   58 % 10 == 8 → Not divisible by 10 → Invalid.