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**Lab 4 Programs**

**Program 1: Luhn Algorithm (Credit Card Check)**

**What is this Program?**

This program checks if a credit card number is valid or not using the Luhn algorithm.  
It is a simple way to verify numbers used in cards.

**How does it work?**

**Step 1: Reverse the number**  
The credit card number is reversed for calculation.

**Step 2: Double every second digit**  
Every second digit (from right side) is doubled.  
If the doubled number is greater than 9, 9 is subtracted from it.

**Step 3: Add all digits**  
All digits are added together to make a total.

**Step 4: Check divisibility by 10**  
If the total is divisible by 10, the number is VALID. Otherwise, it is INVALID.

**Output Example**

Example Run:

4539578763621486 is VALID

4539578763621487 is INVALID

**Why this approach?**

1. Real Use: Luhn check is used in real life for card numbers.
2. Simple Steps: Easy logic with reversing, doubling, and adding.
3. Beginner Friendly: Helps to understand algorithms and loops.

**Program 2: Remove Punctuations**

**What is this Program?**

This program removes all punctuation marks from a text.  
It helps to clean the text for simple reading or processing.

**How does it work?**

**Step 1: Define punctuations**  
A list of common punctuation marks is stored.

**Step 2: Check each character**  
The program goes through each letter of the sentence.

**Step 3: Skip punctuation**  
If a character is punctuation, it is skipped. Otherwise, it is added to the result.

**Output Example**

Example Run:

Original: Hello!!! How are you? I'm fine...

Without Punctuations: Hello How are you Im fine

**Why this approach?**

1. Text Cleaning: Helps in preparing data for analysis.
2. Easy Logic: Simple character checking.
3. Useful: Can be used before text processing in AI/ML.

**Program 3: Sort Words by ASCII of First Letter**

**What is this Program?**

This program sorts the words of a sentence based on the ASCII value of their first letter.  
It is a way to arrange words in order using character codes.

**How does it work?**

**Step 1: Split the sentence**  
The sentence is broken into a list of words.

**Step 2: Find ASCII values**  
The ASCII code of the first letter of each word is found.

**Step 3: Sort words**  
The program compares ASCII values and swaps words to sort them.

**Step 4: Join words back**  
The sorted words are joined again to make a new sentence.

**Output Example**

Example Run:

Original: My name is Kamran I am from Lahore

Sorted: am from I is Kamran Lahore My name

**Why this approach?**

1. Sorting Practice: Good example of sorting logic.
2. ASCII Learning: Shows how characters have numeric codes.
3. Easy to Understand: Simple for beginners.