Objective:

- To get a grip on problem solving involving repetition structure.

Devise Solution of the following problems using flow charts/Pseudo Code

1. Write a pseudo code that asks the user to enter the amount that he or she has budgeted for a month. A loop should then prompt the user to enter each of his or her expenses for the month and keep a running total. When the loop finishes (decide a sentinel value yourself), the program should display the amount that the user is over or under budget.

2. Write a program that requests the user to enter two integers. The program should then calculate and report the sum of all the integers between and including the two integers. At this point, assume that the smaller integer is entered first. For example, if the user enters **2** and **9**, the program should report that the sum of all the integers from 2 through 9 is 44.

3. In a sumac sequence, t_1, t_2, …, t_m, each term is an integer greater than or equal 0. Also, each term, starting with the third, is the difference of the preceding two terms (that is, $t_{n+2}=t_n-t_{n+1}$ for $n\geq 1$). The sequence terminates at tm if $t_{m-1}<t_m$.
For example, if we have 120 and 71, then the sumac sequence generated is as follows:

120, 71, 49, 22, 27.

This is a sumac sequence of length 5.

4. Write a program which calculates the sum of following series:

$1^2 + 2^3 + 3^4 + \ldots + N^{N+1}$

You will take value of 'N' from user.

5. Write a program which calculates the sum of first 'N' term of the following series:

$1^{S+1} + 2^{S+1} + 3^{S+2} + 2^{S+3} + 3^{S+5} + 2^{S+8} + 3^{S+13} + \ldots\ldots$

You will take value of 'N' and 'S' from user.

6. Write a program, which prints all the prime numbers in the range of two given numbers m and n.

7. Display the prime factors of a given positive integer.

8. Write a program which computes the following

$$4 * \sum_{k=1}^{10^6} \frac{(-1)^{k+1}}{2k-1} = 4 * (1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \ldots)$$

9. Write a program that uses nested loops to collect data and calculate the average rainfall over a period of years. The program should first ask for the number of years. The outer loop will iterate once for each year. The inner loop will iterate twelve times, once for each month. Each iteration of the inner loop will ask the user for the inches of rainfall for that month.
After all iterations, the program should display the number of months, the total inches of rainfall, and the average rainfall per month for the entire period.

Input Validation:

Do not accept a number less than 1 for the number of years.
Do not accept negative numbers for the monthly rainfall

10. Strong numbers are the numbers whose sum of factorial of digits is equal to the original number. Example: 145 is a strong number because 1! + 4! + 5! = 145
Your task is to write a pseudo which checks whether a given number is strong number or not.

11. A dual prime is 2 prime numbers that are exactly "2" apart. Example: 3, 5 and 11,13, etc.
In this problem, you need to display all the dual primes up to a given number 'N'.

Success isn't a result of spontaneous combustion. You must set yourself on fire.

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تجھے کتاب سے ممکن نہیں فراغ کہ تُو
کتاب خواں ہے مگر صاحبِ کتاب نہیں!

Dr. Allama Muhammad Iqbal (November 9, 1877 ~ April 21, 1938)