Lab on Loop Problems

1. Write a program to find the factorial of a given number using a loop.
2. Find the sum of the first **n** natural numbers using loops.
3. Calculate the sum of even numbers or odd numbers up to **n**.
4. Generate a multiplication table of a given number using loops.
5. Generate the first **n** terms of the Fibonacci sequence using a loop.
6. Find the GCD of two given numbers using a loop ~~(Euclidean algorithm)~~.
7. Find the LCM of two numbers using a loop and the GCD formula.
8. Write a program to perform the following tasks on a given number using loops:
    a. Count total digits
    b. Find the sum of digits
    c. Reverse the number
    d. Check whether the number is a palindrome
9. Determine whether a number is prime using a loop.
10. Display all prime numbers between two given numbers using nested loops.
11. Check if a number is an Armstrong number (e.g., $153 = 1^3+5^3+3^3$).
12. Find the factors of an integer number.
13. Check whether a number is perfect (sum of its divisors equals the number).
14. Compute $\mathbf{x^n}$ using loops (with and without using the built-in **pow()** function).
15. Check if a number is a strong number (sum of factorials of digits = number).
16. Convert a decimal number into binary using loops (by repeated division by 2).
17. Calculate the sum of cubes of the first **n** natural numbers.
$$1^3 + 2^3 + 3^3 + \cdots + n^3$$
18. Calculate the sum of the harmonic series up to **n** terms:
$$1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$$
19. Find the sum of the series:
$$1 - 2 + 3 - 4 + 5 - 6 + \cdots \pm n$$
20. Find the sum of the series:
$$1! + 2! + 3! + \cdots + n!$$