Project 1
Title: "Build Your Own Number Theory Calculator"

Create a simple Python tool that allows users to find the **GCD**, **LCM**, and **Prime Factors** of numbers without using built-in math functions. The project will help you understand how numbers work behind the scenes by coding the logic yourself through an interactive menu.

Algorithm: Number Theory Calculator

Step 1: Start the Program

- Show a welcome message and menu:
  1. Find GCD
  2. Find LCM
  3. Find Prime Factorization
  4. Exit

Step 2: Ask for User Choice

- Let the user choose an option (1, 2, 3, or 4)

Step 3: Process the User's Choice

If the user selects GCD (Option 1):

- Ask for two numbers
- Start a loop from the smaller number down to 1
- If a number divides both numbers, that is the GCD
- Show the result

If the user selects LCM (Option 2):

- Ask for two numbers
- Start from the larger number and keep checking
- If a number is divisible by both inputs, it's the LCM
- Show the result

If the user selects Prime Factorization (Option 3):

- Ask for one number
- Start dividing by 2, then 3, 4, 5… up to that number
- If it divides, add it to the list of factors and divide again
- Repeat until number becomes 1
- Show the prime factors

If the user selects Exit (Option 4):

- Show a goodbye message
- End the program

- After finishing a calculation, show the menu again
- Keep repeating until the user chooses to exit

Pseudocode: Number Theory Calculator

```
PROGRAM NumberTheoryCalculator
   DISPLAY welcome message and menu options:
      1. Compute GCD
      2. Compute LCM
      3. Perform Prime Factorization
      4. Exit

   REPEAT
      GET user choice from menu input
      IF choice is 1 (GCD):
         GET two integers (a, b) from user
         COMPUTE GCD using Euclidean Algorithm:
            WHILE b is not zero:
               UPDATE a, b = b, a MOD b
         OUTPUT GCD result (stored in a)
      ELSE IF choice is 2 (LCM):
         GET two integers (a, b) from user
         COMPUTE LCM using GCD:
            SET product = a * b
            COMPUTE GCD (as above)
            SET LCM = product / GCD
         OUTPUT LCM result
      ELSE IF choice is 3 (Prime Factorization):
         GET integer (n) from user
         INITIALIZE empty list of factors
         SET divisor = 2
         WHILE divisor squared <= n:
            WHILE n is divisible by divisor:
               ADD divisor to factors
               UPDATE n = n / divisor
            INCREMENT divisor
         IF remaining n > 1:
            ADD n to factors
         OUTPUT list of factors
      ELSE IF choice is 4 (Exit):
         DISPLAY exit message
         TERMINATE program
      ELSE:
         DISPLAY invalid input error
   UNTIL user chooses Exit
END PROGRAM
```