

7.Implementing programs using Functions. (Factorial, largest number in a list and area of shape)

input:

```
def area_triangle(base, height):  
    return 0.5 * base * height  
def main():  
    while True:  
        print("\n--- MENU ---")  
        print("1. Factorial")  
        print("2. Largest Number in a List")  
        print("3. Area of Shape")  
        print("4. Exit")  
  
        choice = input("Enter your choice (1-4): ")  
  
        if choice == '1':  
            num = int(input("Enter a number: "))  
            print("Factorial of", num, "is", factorial(num))  
  
        elif choice == '2':  
            nums = input("Enter numbers separated by spaces: ")  
            num_list = [int(x) for x in nums.split()]  
            print("Largest number is:", find_largest(num_list))
```

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0 1 1
=== C

```
elif choice == '3':
    print("\nChoose shape: 1. Circle 2. Rectangle 3.
          Triangle")
    shape_choice = input("Enter shape choice (1/2/3): ")

    if shape_choice == '1':
        r = float(input("Enter radius: "))
        print("Area of Circle =", area_circle(r))
    elif shape_choice == '2':
        l = float(input("Enter length: "))
        b = float(input("Enter breadth: "))
        print("Area of Rectangle =", area_rectangle(l, b
        ))
    elif shape_choice == '3':
        base = float(input("Enter base: "))
        height = float(input("Enter height: "))
        print("Area of Triangle =", area_triangle(base,
        height))
    else:
        print("Invalid shape choice!")
```

```
elif choice == '4':
    print("Exiting program. Thank you!")
    break
else:
    print("Invalid choice. Please try again.")
```

```
main()
```

Output:

```
--- MENU ---
1. Factorial
2. Largest Number in a List
3. Area of Shape
4. Exit
Enter your choice (1-4): 1
Enter a number: 5
Factorial of 5 is 120

--- MENU ---
1. Factorial
2. Largest Number in a List
3. Area of Shape
4. Exit
Enter your choice (1-4): 2
Enter numbers separated by spaces: 1 2 3 4 5
Largest number is: 5
```

--- MENU ---

1. Factorial
2. Largest Number in a List
3. Area of Shape
4. Exit

Enter your choice (1-4): 3

Choose shape: 1. Circle 2. Rectangle 3. Triangle

Enter shape choice (1/2/3): 2

Enter length: 2

Enter breadth: 3

Area of Rectangle = 6.0

8.Solve the Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns and pyramid pattern)

Input:

```
# 1. Number Series (e.g., square of numbers up to n)
def number_series(n):
    print("\nNumber Series (Squares):")
    for i in range(1, n+1):
        print(f"{i}² = {i*i}")

# 2. Number Pattern
def number_pattern(n):
    print("\nNumber Pattern:")
    for i in range(1, n+1):
        for j in range(1, i+1):
            print(j, end=" ")
        print()

# 3. Pyramid Pattern
def pyramid_pattern(n):
    print("\nPyramid Pattern:")
    for i in range(1, n+1):
        print(" " * (n - i), end="") # spaces
        print("* " * i)
```

```

# Main menu
def main():
    while True:
        print("\n--- MENU ---")
        print("1. Number Series (Squares)")
        print("2. Number Pattern")
        print("3. Pyramid Pattern")
        print("4. Exit")

        choice = input("Enter your choice (1-4): ")

        if choice in ['1', '2', '3']:
            n = int(input("Enter number of rows/terms (n): "))
            if n <= 0:
                print("Please enter a positive number.")
                continue

            if choice == '1':
                number_series(n)
            elif choice == '2':
                number_pattern(n)
            elif choice == '3':
                pyramid_pattern(n)

            elif choice == '4':
                print("Exiting program.")
                break
            else:
                print("Invalid choice. Try again.")

# Run the program
main()

```

Output:

```
--- MENU ---
1. Number Series (Squares)
2. Number Pattern
3. Pyramid Pattern
4. Exit
Enter your choice (1-4): 1
Enter number of rows/terms (n): 5

Number Series (Squares):
 $1^2 = 1$ 
 $2^2 = 4$ 
 $3^2 = 9$ 
 $4^2 = 16$ 
 $5^2 = 25$ 
```

--- MENU ---

1. Number Series (Squares)

2. Number Pattern

3. Pyramid Pattern

4. Exit

Enter your choice (1-4): 2

Enter number of rows/terms (n): 5

Number Pattern:

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

--- MENU ---

1. Number Series (Squares)

2. Number Pattern

3. Pyramid Pattern

4. Exit

Enter your choice (1-4): 3

Enter number of rows/terms (n): 5

Pyramid Pattern:

```
    *
  * *
* * *
* * * *
* * * * *
```

9. Write a program to find the LCM and GCD of a given number.

Input:

```
# Function to calculate GCD
def find_gcd(a, b):
    while b != 0:
        a, b = b, a % b
    return a

# Function to calculate LCM using GCD
def find_lcm(a, b):
    gcd = find_gcd(a, b)
    return (a * b) // gcd

# Main program
def main():
    # Input two numbers
    num1 = int(input("Enter first number: "))
    num2 = int(input("Enter second number: "))

    # Calculate GCD and LCM
    gcd = find_gcd(num1, num2)
    lcm = find_lcm(num1, num2)

    # Display results
    print(f"\nGCD of {num1} and {num2} is: {gcd}")
    print(f"LCM of {num1} and {num2} is: {lcm}")

# Run the program
main()
```

Output:

```
Enter first number: 2
```

```
Enter second number: 3
```

```
GCD of 2 and 3 is: 1
```

```
LCM of 2 and 3 is: 6
```