School of Computer Science and Artificial Intelligence

Lab Assignment # 1.2

Program : B. Tech (CSE)

Specialization :AIML

Course Title : AI Assisted Coding

Course Code : 23CS002PC304

Semester : VI

Academic Session : 2025-2026

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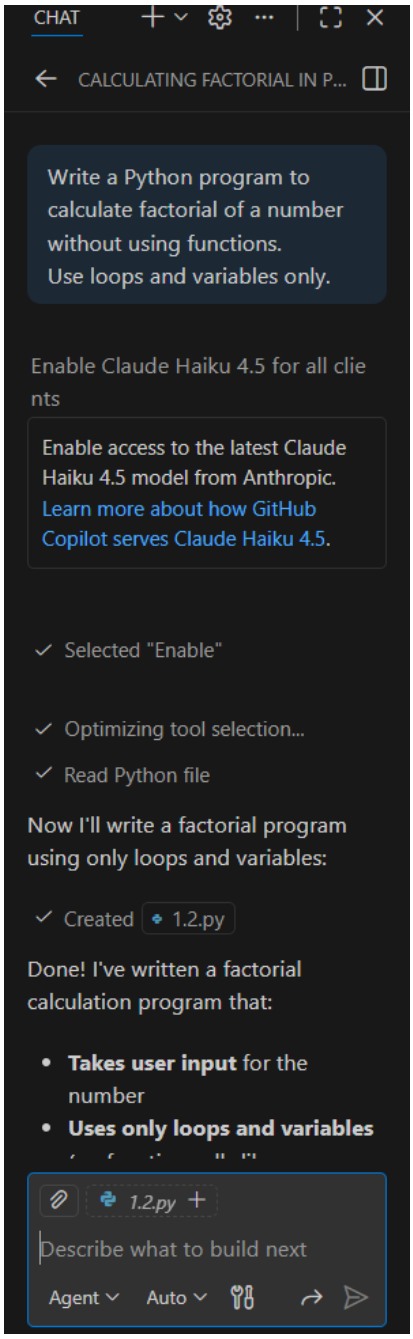
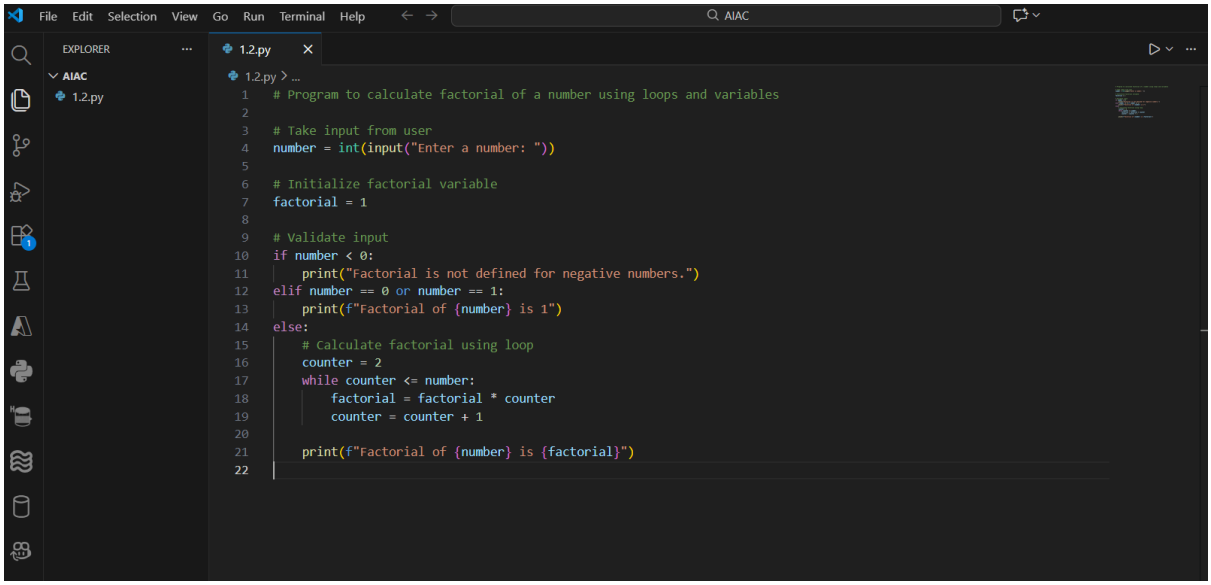
Enrollment No. : 2303A52100

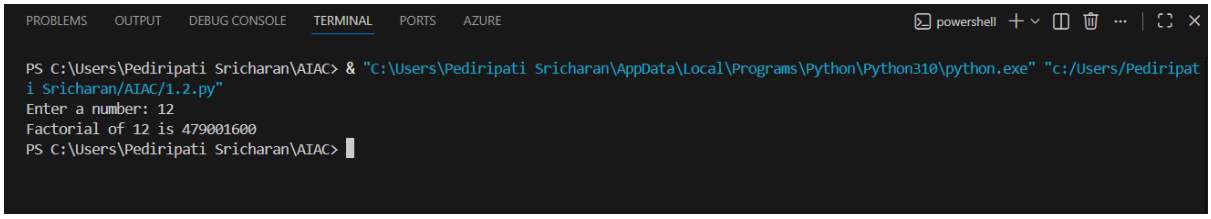
Batch No. : 33

Date :09/01/26

TASK _01


CHAT
CALCULATING FACTORIAL IN P...
Write a Python program to calculate factorial of a number without using functions.
Use loops and variables only.
Enable Claude Haiku 4.5 for all clients
Enable access to the latest Claude Haiku 4.5 model from Anthropic. Learn more about how GitHub Copilot serves Claude Haiku 4.5.
Selected "Enable"
Optimizing tool selection...
Read Python file
Now I'll write a factorial program using only loops and variables:
Created 1.2.py
Done! I've written a factorial calculation program that:
Takes user input for the number
Uses only loops and variables
1.2.py
Describe what to build next
Agent
Auto

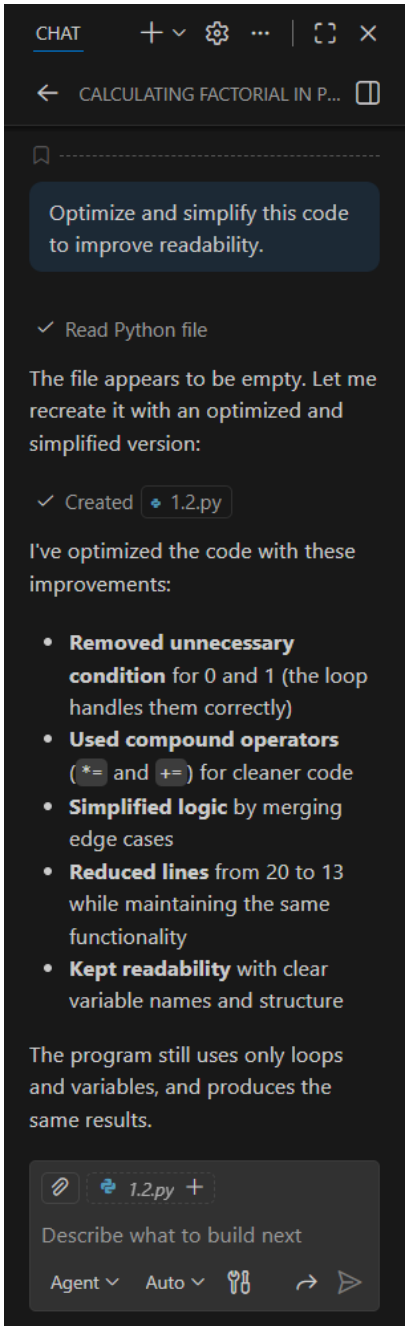


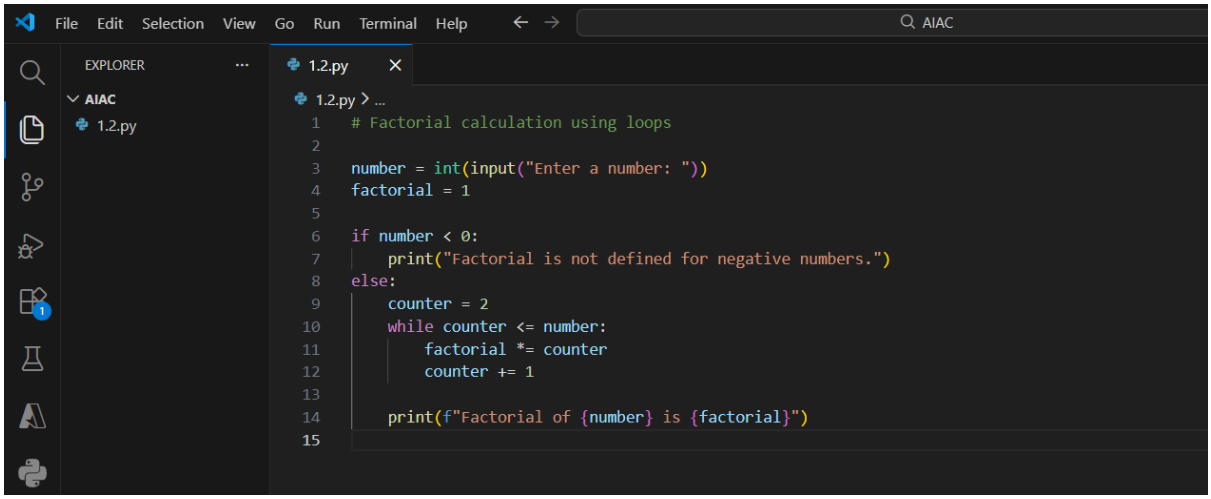


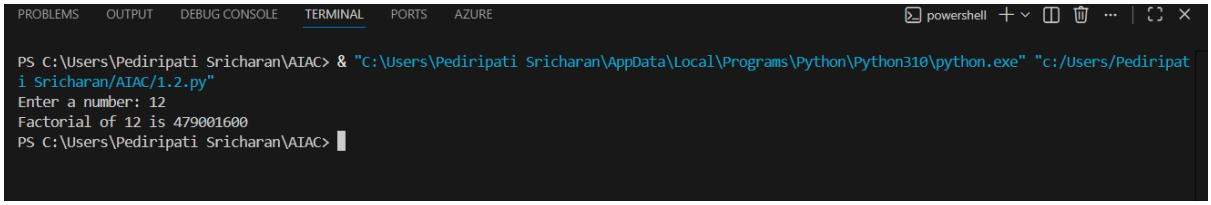
EXPLANATION:

GitHub Copilot helped me quickly generate a working factorial program.
It followed basic Python syntax and logic correctly.
For beginners, it saves time and reduces syntax errors.
However, understanding the logic is still important.
Copilot gives suggestions but human review is needed

TASK_02:


CHAT
CALCULATING FACTORIAL IN P...
Optimize and simplify this code to improve readability.
Read Python file
The file appears to be empty. Let me recreate it with an optimized and simplified version:
Created 1.2.py
I've optimized the code with these improvements:
Removed unnecessary condition for 0 and 1 (the loop handles them correctly)
Used compound operators (*= and +=) for cleaner code
Simplified logic by merging edge cases
Reduced lines from 20 to 13 while maintaining the same functionality
Kept readability with clear variable names and structure
The program still uses only loops and variables, and produces the same results.
1.2.py
Describe what to build next
Agent
Auto

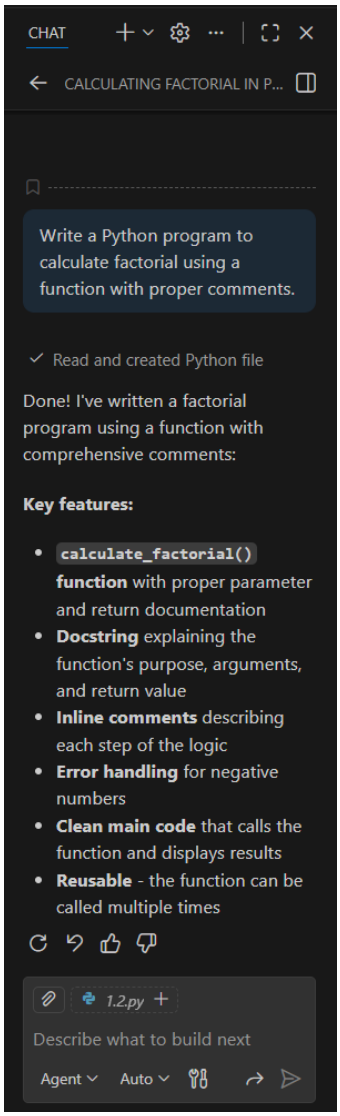

File Edit Selection View Go Run Terminal Help
AIAC
EXPLORER
AIAC
1.2.py
1.2.py
1.2.py > ...
# Factorial calculation using loops
number = int(input("Enter a number: "))
factorial = 1
if number < 0:
print("Factorial is not defined for negative numbers.")
else:
counter = 2
while counter <= number:
factorial *= counter
counter += 1
print(f"Factorial of {number} is {factorial}")



Explanation

- Better variable names
- Cleaner output
- More readable

TASK_03:



1.2.py

C:\Users\Pediripati Sricharan\AIAC\1.2.py

```python
# Program to calculate factorial using a function with proper comments

def calculate_factorial(n):
    """
    Calculate the factorial of a number.

    Args:
        n (int): The number to calculate factorial for

    Returns:
        int: The factorial of n, or None if invalid input
    """
    # Check for invalid input (negative numbers)
    if n < 0:
        print("Error: Factorial is not defined for negative numbers.")
        return None

    # Base case: factorial of 0 or 1 is 1
    if n == 0 or n == 1:
        return 1

    # Initialize result variable
    result = 1

    # Multiply all numbers from 2 to n
    counter = 2
    while counter <= n:
        result *= counter
        counter += 1

    return result


# Main program - Get input and display result
number = int(input("Enter a number: "))
factorial_result = calculate_factorial(number)

if factorial_result is not None:
    print(f"Factorial of {number} is {factorial_result}")
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  AZURE                powershell

PS C:\Users\Pediripati Sricharan\AIAC> & "C:\Users\Pediripati Sricharan\AppData\Local\Programs\Python\Python310\python.exe" "c:/Users/Pediripat
i Sricharan/AIAC/1.2.py"
Enter a number: 12
Factorial of 12 is 479001600
PS C:\Users\Pediripati Sricharan\AIAC>
```

EXPLANATION:

Using functions improves reusability.
The same function can be used in many programs.
Code becomes cleaner and easier to maintain.

TASK_04:

Comparative Analysis – Procedural vs Modular AI Code

Procedural (Without Functions) vs Modular (With Functions)

In Task 1, the factorial program was written using a procedural approach, where all the logic was implemented directly in the main execution flow without using any user-defined functions. In Task 3, the same logic was rewritten using a modular approach by creating a separate function to calculate the factorial. Both approaches produce the same output, but they differ significantly in terms of design quality and usability.

Logic Clarity:
The procedural version is simple and easy to understand for small programs. However, as the program grows, the logic becomes harder to follow because everything is written in one place. In contrast, the modular version separates the factorial logic into a function, making the code more organized and easier to read.

Reusability:
The procedural code cannot be reused easily because the logic is tied to a single script. The modular version allows the factorial function to be reused in multiple programs without rewriting the same code, which saves time and effort.

Debugging Ease:
Debugging procedural code is more difficult because errors can affect

the entire program. In modular code, each function can be tested separately, making it easier to find and fix errors.

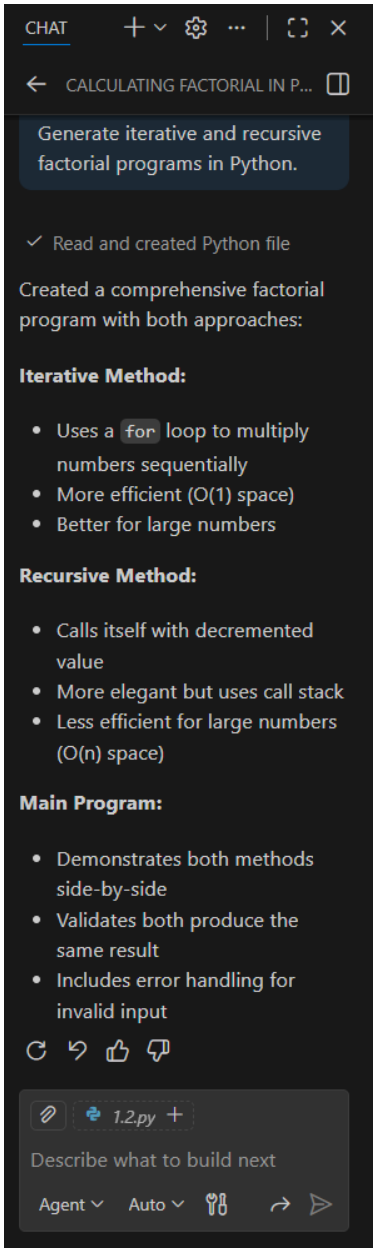
Suitability for Large Projects:
Procedural code is suitable only for small, simple programs. For large projects, modular code is preferred because it supports better structure, teamwork, and maintenance.

AI Dependency Risk:
When using AI tools like GitHub Copilot, procedural code may be generated quickly but often lacks proper structure. Modular code encourages better design practices, even when AI is used. This reduces the risk of poor-quality code.

Conclusion:

While procedural programming is useful for quick tasks and learning basics, modular programming is more efficient, reusable, and suitable for real-world software development. Using functions improves clarity, maintainability, and scalability, making modular code the better choice for professional projects.

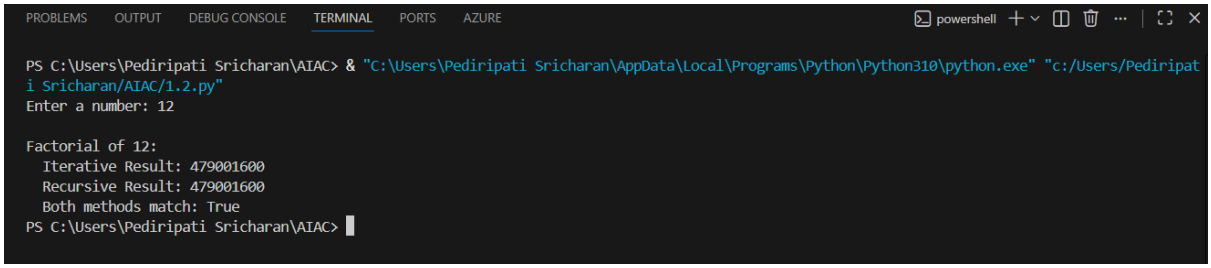
TASK_05:


CHAT
CALCULATING FACTORIAL IN P...
Generate iterative and recursive factorial programs in Python.
Read and created Python file
Created a comprehensive factorial program with both approaches:
Iterative Method:
Uses a for loop to multiply numbers sequentially
More efficient (O(1) space)
Better for large numbers
Recursive Method:
Calls itself with decremented value
More elegant but uses call stack
Less efficient for large numbers (O(n) space)
Main Program:
Demonstrates both methods side-by-side
Validates both produce the same result
Includes error handling for invalid input
1.2.py
Describe what to build next
Agent
Auto

1.2.py

C:\Users\Pediripati Sricharan\AIAC\1.2.py

```python
# Factorial Programs: Iterative and Recursive Approaches

# ===== ITERATIVE APPROACH =====
def factorial_iterative(n):
    """
    Calculate factorial using iteration (loop).
    Time Complexity: O(n)
    Space Complexity: O(1)
    """
    # Handle invalid input
    if n < 0:
        return None

    # Initialize result
    result = 1

    # Multiply numbers from 2 to n
    for i in range(2, n + 1):
        result *= i

    return result


# ===== RECURSIVE APPROACH =====
def factorial_recursive(n):
    """
    Calculate factorial using recursion.
    Time Complexity: O(n)
    Space Complexity: O(n) - due to call stack
    """
    # Handle invalid input
    if n < 0:
        return None

    # Base case: factorial of 0 or 1 is 1
    if n == 0 or n == 1:
        return 1

    # Recursive case: n! = n * (n-1)!
    return n * factorial_recursive(n - 1)


# ===== MAIN PROGRAM =====
def main():
    """Main program to demonstrate both approaches."""

    try:
        number = int(input("Enter a number: "))

        # Calculate using iterative approach
        iter_result = factorial_iterative(number)

        # Calculate using recursive approach
        recur_result = factorial_recursive(number)

        # Display results
        if iter_result is None:
            print("Error: Factorial is not defined for negative numbers.")
        else:
            print(f"\nFactorial of {number}:")
            print(f"  Iterative Result: {iter_result}")
            print(f"  Recursive Result: {recur_result}")
            print(f"  Both methods match: {iter_result == recur_result}")

    except ValueError:
        print("Error: Please enter a valid integer.")


# Run the program
if __name__ == "__main__":
    main()
```



Explanation

- Iterative uses loop
- Recursive calls itself
- Recursion uses more memory
- Iterative is faster