SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE		DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
Program Name: B. Tech		**Assignment Type: Lab**	**Academic Year:**2025-2026
Course Coordinator Name	Dr. Rishabh Mittal		
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CourseCode	23CS002PC304	**Course Title**	AI Assisted Coding
Year/Sem	III/II	**Regulation**	R23
Date and Day of Assignment	**Week1 - Tuesday**	**Time(s)**	23CSBTB01 To 23CSBTB52
Duration	2 Hours	**Applicable to Batches**	All batches
Assignment Number:1.2(Present assignment number)/**24**(Total number of assignments)			

Q.No.	Question	***Expected Time to complete***
1	Lab 1: Environment Setup – *GitHub Copilot and VS Code Integration + Understanding AI-assisted Coding Workflow* **Lab Objectives:**	Week1 - Monday

- To install and configure GitHub Copilot in Visual Studio Code.
- To explore AI-assisted code generation using GitHub Copilot.
- To analyze the accuracy and effectiveness of Copilot's code suggestions.
- To understand prompt-based programming using comments and code context

Lab Outcomes (LOs):
After completing this lab, students will be able to:

- Set up GitHub Copilot in VS Code successfully.
- Use inline comments and context to generate code with Copilot.
- Evaluate AI-generated code for correctness and readability.
- Compare code suggestions based on different prompts and programming styles.

Task 0

- Install and configure GitHub Copilot in VS Code. Take screenshots of each step.

Expected Output

- Install and configure GitHub Copilot in VS Code. Take screenshots of each step.

Task 1: AI-Generated Logic Without Modularization (Factorial without Functions)

- **Scenario**

You are building a **small command-line utility** for a startup intern onboarding task. The program is simple and must be written quickly without modular design.

- **Task Description**

Use GitHub Copilot to generate a Python program that computes a mathematical product-based value (factorial-like logic) directly in the main execution flow, without using any user-defined functions.

- **Constraint:**

 Do not define any custom function

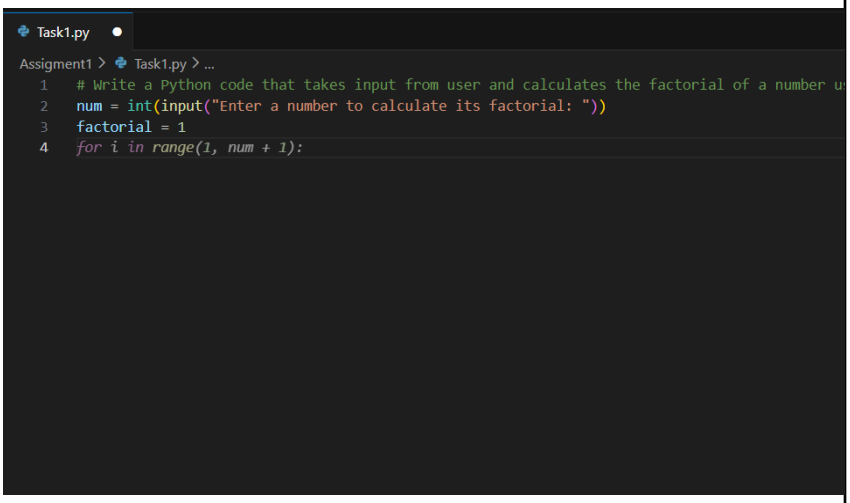
 Logic must be implemented using loops and variables only

- **Expected Deliverables**

- A working Python program generated with Copilot assistance

```
num = int(input("Enter a number to calculate its factorial: "))
factorial = 1
for i in range(1, num + 1):
    factorial *= i
print(f"The factorial of {num} is {factorial}")
```

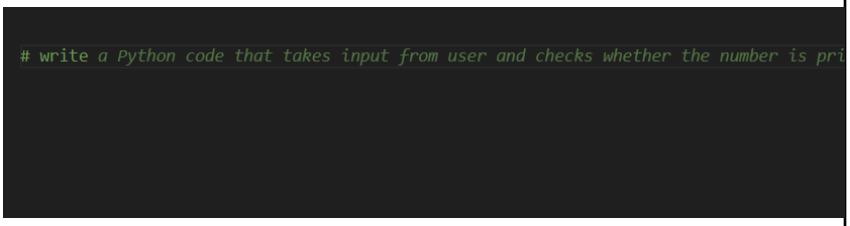
- Screenshot(s) showing:



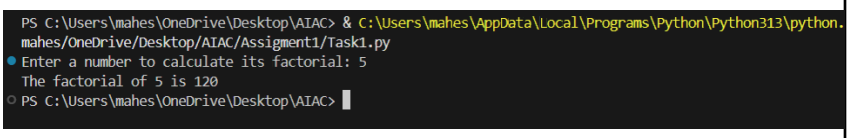
- The prompt you typed

```
Write a Python code that takes input from user and calculates the factorial of a number using a for loop...without using any functions...
```

- Copilot's suggestions



- Sample input/output screenshots



- Brief reflection (5–6 lines):

```
You give it a number as input.
The program prompts the user to enter an integer.
It initializes a variable to 1 to hold the
factorial result.
It loops from 1 up to the entered number,
multiplying the result by each integer in
sequence.
Finally, it prints out the calculated factorial
value for the given number.
```

- How helpful was Copilot for a beginner?

```
We can generate code in just seconds simply by
writing a prompt. It is very helpful for learning
and allows us to engage in a much more efficient
way.
```

- Did it follow best practices automatically?

```
Yes, it automatically implemented several coding
best practices
```

Task 2: AI Code Optimization & Cleanup (Improving Efficiency)

❖ **Scenario**

Your team lead asks you to **review AI-generated code** before committing it to a shared repository.

❖ **Task Description**

Analyze the code generated in **Task 1** and use Copilot again to:

- Reduce unnecessary variables
- Improve loop clarity
- Enhance readability and efficiency

Hint:
Prompt Copilot with phrases like
“optimize this code”, *“simplify logic”*, or *“make it more readable”*

❖ **Expected Deliverables**

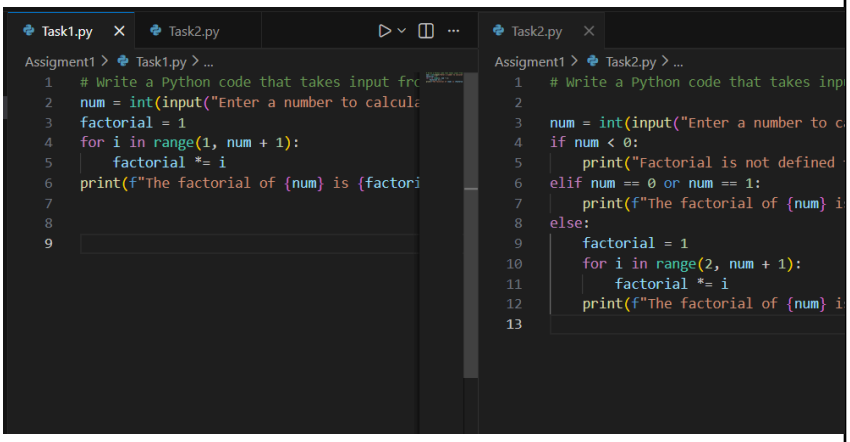
- Original AI-generated code

```
num = int(input("Enter a number to calculate its
factorial: "))
factorial = 1
for i in range(1, num + 1):
    factorial *= i
print(f"The factorial of {num} is {factorial}")
```

- Optimized version of the same code

```
num = int(input("Enter a number to calculate its
factorial: "))
if num < 0:
    print("Factorial is not defined for negative
numbers.")
elif num == 0 or num == 1:
    print(f"The factorial of {num} is 1")
else:
    factorial = 1
    for i in range(2, num + 1):
        factorial *= i
    print(f"The factorial of {num} is
{factorial}")
```

- Side-by-side comparison



- Written explanation:
  - What was improved?

```
In the optimized code it first checks for
negative numbers and if the user enters 1 or 0
it runs faster than the original code.
```

  - Why the new version is better (readability, performance, maintainability.

```
using if-else blocks for edge cases like 0 and
1 it makes faster to run compared to orginal
code
```

Task 3: Modular Design Using AI Assistance (Factorial with Functions)

❖ **Scenario**

The same logic now needs to be reused in **multiple scripts**.

❖ **Task Description**

Use GitHub Copilot to generate a **modular version** of the program by:

- Creating a **user-defined function**
- Calling the function from the main block

❖ **Constraints**

- Use meaningful function and variable names
- Include inline comments (preferably suggested by Copilot)

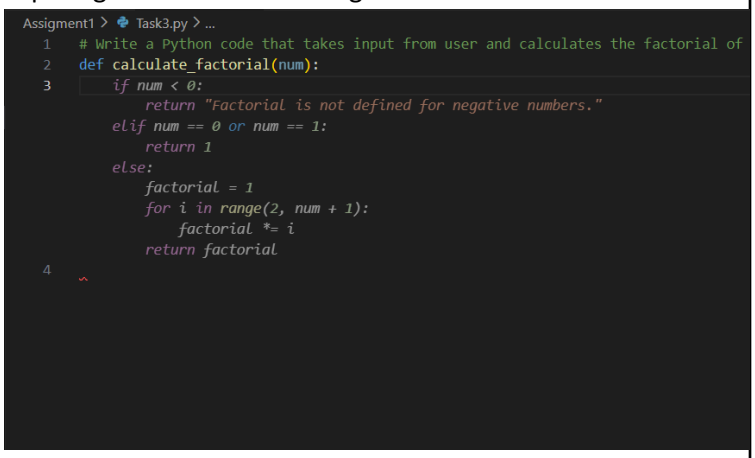
❖ **Expected Deliverables**

- AI-assisted function-based program

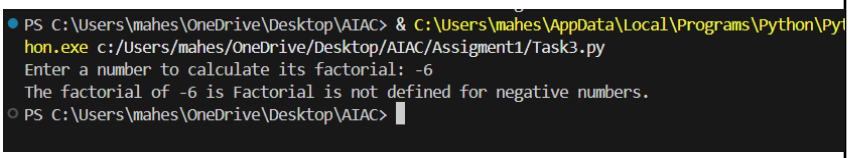
```
def calculate_factorial(num):
    if num < 0:
        return "Factorial is not defined for
negative numbers."
    elif num == 0 or num == 1:
        return 1
    else:
        factorial = 1
```

```
        for i in range(2, num + 1):
            factorial *= i
        return factorial
num = int(input("Enter a number to calculate its
factorial: "))
result = calculate_factorial(num)
print(f"The factorial of {num} is {result}")
```

- Screenshots showing:
  - Prompt evolution
  - Copilot-generated function logic



- Sample inputs/outputs



- Short note:
  - How modularity improves reusability

```
modules that can be reused across projects
without rewriting, reducing duplication and
enhancing maintainability.
```

Task 4: Comparative Analysis – Procedural vs Modular AI Code (With vs Without Functions)

❖ **Scenario**

As part of a **code review meeting**, you are asked to justify design choices.

❖ **Task Description**

Compare the **non-function** and **function-based** Copilot-generated programs on the following criteria:

- Logic clarity
- Reusability
- Debugging ease
- Suitability for large projects
- AI dependency risk

❖ **Expected Deliverables**

Choose **one**:

- A comparison table

```
PS C:\Users\mahes\OneDrive\Desktop\AIAC> & C:\Users\mahes\AppData\Local\Programs\Python\Py
hon.exe c:/Users/mahes/OneDrive/Desktop/AIAC/Assigment1/Task4.py
=== PROCEDURAL VERSION ===
Enter a number to calculate its factorial: 5
The factorial of 5 is 120
⏱ Execution Time (Procedural): 2207.452900 ms

==================================================

=== MODULAR VERSION ===
Enter a number to calculate its factorial: 5
The factorial of 5 is 120
⏱ Execution Time (Modular): 1376.439900 ms

==================================================
PERFORMANCE ANALYSIS
==================================================
Procedural Version: 2207.452900 ms
Modular Version:    1376.439900 ms

Modular was faster by 831.013000 ms
```

Feature	Non-Function Approach (Task 1)	Function-Based Approach (Task 2)
Structure	**Monolithic:** Logic, input, and output are mixed in one global block.	**Modular:** Logic is encapsulated in a specific function, separating it from I/O.
Reusability	**Low:** Code must be copied and pasted to be used elsewhere.	**High:** Function can be imported and called by any other script or module.
Error Handling	**Basic:** Uses simple `print` statements (e.g., "Error: Negative number").	**Robust:** Uses Exceptions (`raise ValueError`) allowing programs to catch and manage errors.
Testing	**Difficult:** Requires manual user input for every test case.	**Easy:** Can be automated using Unit Tests to verify logic instantly.
Maintainability	**Poor:** Changes to logic might break the input/output flow.	**Excellent:** You can upgrade the math logic without touching the rest of the code.

OR

- A short technical report (300–400 words).

Task 5: AI-Generated Iterative vs Recursive Thinking

❖ **Scenario**

Your mentor wants to test how well AI understands different computational paradigms.

❖ **Task Description**

Prompt Copilot to generate:
An **iterative** version of the logic
A **recursive** version of the same logic

❖ **Constraints**

Both implementations must produce identical outputs
Students must **not manually write the code first**

❖ **Expected Deliverables**

Two AI-generated implementations
Execution flow explanation (in your own words)
Comparison covering:

- Readability

Iterative

```
def factorial_iterative(n):
    if n < 0:
        return "Factorial is not defined for negative
numbers."
    elif n == 0 or n == 1:
        return 1
    else:
        result = 1
        for i in range(2, n + 1):
            result *= i
        return result

num = int(input("Enter a number to calculate its
factorial: "))
factorial_result = factorial_iterative(num)
print(f"The factorial of {num} is
{factorial_result}")
```

recursive

```
def factorial_recursive(n):
    if n < 0:
        return "Factorial is not defined for negative
numbers."
    elif n == 0 or n == 1:
        return 1
    else:
        return n * factorial_recursive(n - 1)
num = int(input("Enter a number to calculate its
factorial: "))
factorial_result = factorial_recursive(num)
print(f"The factorial of {num} is
{factorial_result}")
```

- Stack usage

```
an iterative one using a loop for factorial
calculation and a recursive one..both handling
negatives and base cases with user input and
output.
```

- Performance implications

```
Time Complexity: Both iterative and recursive
approaches are O(n)
Space Complexity: Iterative uses O(1) and
Recursive uses O(n) space due to call stack.
```

- When recursion is *not* recommended.

```
when input n is large as it can cause stack
overflow due to deep call stacks
```

Submission Requirements

1. Generate code for each task with comments.
2. Screenshots of Copilot suggestions.
3. Comparative analysis reports (Task 4 and Task 5).
4. Sample inputs/outputs demonstrating correctness.

	Note: Report should be submitted as a word document for all tasks in a single document with prompts, comments & code explanation, and output and if required, screenshots.	