

AI ASSISTED CODING

RISHAAK

2303A51125

BATCH – 03

07 – 01 – 2026

ASSIGNMENT – 1.1

Lab 1: Environment Setup – GitHub Copilot and VS Code Integration + Understanding AI-assisted Coding Workflow Lab Objectives:

- 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.

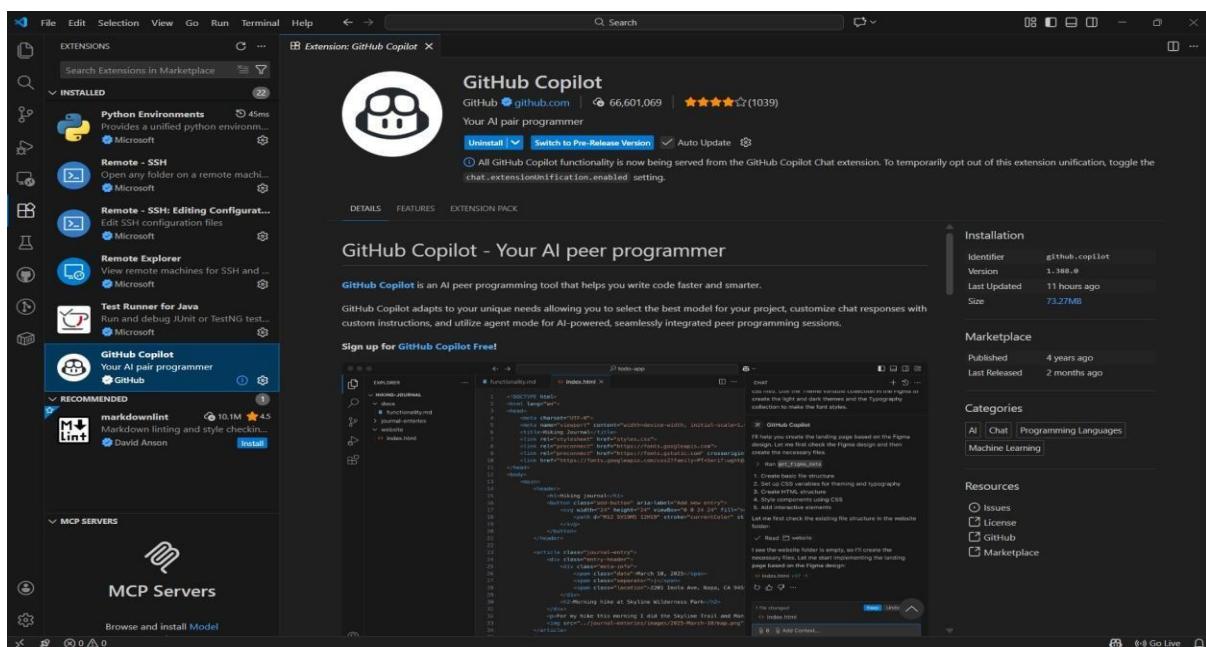
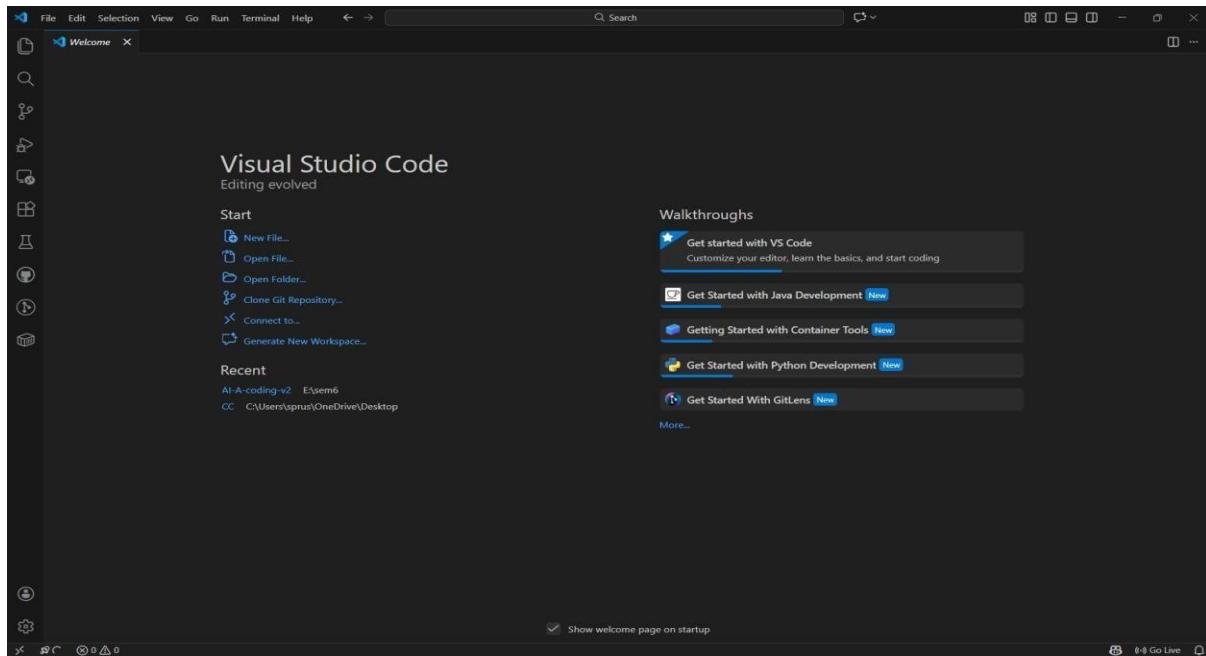
Task o

- 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 o: Environment Setup:-



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 ➤ Screenshot(s) showing:

- The prompt you typed ➤ Copilot's suggestions
- Sample input/output screenshots ➤ Brief reflection (5–6 lines):
 - How helpful was Copilot for a beginner?
 - Did it follow best practices automatically?

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

The screenshot shows the VS Code interface with the following details:

- File Explorer:** Shows a folder named "AI-A-CODING-V2" containing ".github", "day1.py", and "README.md".
- Editor:** The "day1.py" file is open, displaying the following Python code:

```
You, now | 1 author (You)
1 # 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.
2 # Use Github Copilot to generate a Python program that computes a mathematical product-based value (factorial-like logic) directly
3 import sys
4 if __name__ <__ > Accept [?] Accept Word [?] + [Signature] ...
5     if len(sys.argv) != 2:
6         print("Usage: python day1.py <non-negative integer>")
7         sys.exit(1)

try:
8     n = int(sys.argv[1])
9     if n < 0:
10        raise ValueError
11 except ValueError:
12     print("Please provide a valid non-negative integer.")
13     sys.exit(1)

product = 1
for i in range(1, n + 1):
    product *= i

print(f"The product-based value for {n} is: {product}")
```
- Terminal:** Shows the command "PS E:\sem6\AI-A-coding-v2> []" and the output "Welcome to the team, hil!"
- Status Bar:** Shows "Ln 5, Col 5" and "3.14.0 Go Live".

The screenshot shows the VS Code interface with the following details:

- File Explorer:** Shows a folder named "AI-A-CODING-V2" containing ".github", "day1.py", and "README.md".
- Editor:** The "day1.py" file is open, displaying the same Python code as the first screenshot.
- Terminal:** Shows the command "PS E:\sem6\AI-A-coding-v2> & 'c:\Python314\python.exe' 'c:\Users\sprus\.vscode\extensions\ms-python.python.debug-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '52393' '--' 'e:\sem6\AI-A-coding-v2\day1.py'" and the output:

```
You, 3 minutes ago | 1 author (You)
1 # 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.
2 # 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 usi...
3 import sys
4 if __name__ == "__main__":
5     if len(sys.argv) != 2:
6         print("Usage: python day1.py <non-negative integer>")
7         sys.exit(1)

try:
8     n = int(sys.argv[1])
9     if n < 0:
10        raise ValueError
11 except ValueError:
12     print("Please provide a valid non-negative integer.")
13     sys.exit(1)

product = 1
for i in range(1, n + 1):
    product *= i

print(f"The product-based value for {n} is: {product}")
```
- Terminal Output:** Shows the command "PS E:\sem6\AI-A-coding-v2> python day1.py 5" and the output "The product-based value for 5 is: 120".
- Status Bar:** Shows "PS E:\sem6\AI-A-coding-v2> []" and "You, 10 hours ago Not Committed Yet Ln 20, Col 1 Spaces: 4 UTF-8 CRLF Python 3.14.0 Go Live".

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
- Optimized version of the same code ➢ Side-by-side comparison ➢ Written explanation:
 - What was improved?
 - Why the new version is better (readability, performance, maintainability).

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

```

day1.py M task2.py U
task2.py
1 # In Task 2, the AI-generated code from Task 1 was reviewed and optimized.
2 # Unnecessary loop iterations were removed by starting the loop from 2 instead of 1.
3 # Output text was simplified to improve readability.
4 # The code structure was kept flat to follow the no-function constraint.
5 # Overall, the optimized version is easier to read, slightly more efficient, and more maintainable while producing the same result.
6
7 import sys
8 if __name__ == "__main__":
9     if len(sys.argv) != 2:
10         print("Usage: python task2.py <non-negative integer>")
11         sys.exit(1)
12
13     try:
14         n = int(sys.argv[1])
15         if n < 0:
16             raise ValueError
17     except ValueError:
18         print("Please provide a valid non-negative integer.")
19         sys.exit(1)
20
21     product = 1
22     for i in range(2, n + 1):
23         product *= i
24
25     print(product)

```



```

File Edit Selection View Go Run Terminal Help ← → Q AI-A-coding v2
task2.py
1 # In Task 2, the AI-generated code from Task 1 was reviewed and optimized.
2 # Unnecessary loop iterations were removed by starting the loop from 2 instead of 1.
3 # Output text was simplified to improve readability.
4 # The code structure was kept flat to follow the no-function constraint.
5 # Overall, the optimized version is easier to read, slightly more efficient, and more maintainable while producing the same result.
6
7 import sys
8 if __name__ == "__main__":
9     if len(sys.argv) != 2:
10         print("Usage: python task2.py <non-negative integer>")
11         sys.exit(1)
12
13     try:
14         n = int(sys.argv[1])
15         if n < 0:
16             raise ValueError
17     except ValueError:
18         print("Please provide a valid non-negative integer.")
19         sys.exit(1)
20
21     product = 1
22     for i in range(2, n + 1):
23         product *= i
24
25     print(product)

```



```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS
PS E:\sem6\AI-A-coding-v2> python task2.py 5
120
PS E:\sem6\AI-A-coding-v2>

```

In 24, Col 19 Spaces: 4 UTF-8 CRLF () Python 3.14.0 ⓘ Go Live

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

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

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

❖ Expected Deliverables

- AI-assisted function-based program ➤

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

- Sample inputs/outputs
- Short note:
o How modularity improves reusability.

```
# Task 3: Modular Design Using AI Assistance (Factorial with Functions)
# The same logic now needs to be reused in multiple scripts.

import sys

def compute_factorial(n):
    if n < 0:
        raise ValueError("Negative values are not allowed.")
    product = 1
    for i in range(2, n + 1):
        product *= i
    return product

if __name__ == "__main__":
    if len(sys.argv) != 2:
        print("Usage: python task3.py <non-negative integer>")
        sys.exit(1)

    try:
        n = int(sys.argv[1])
    except ValueError:
        print("Please provide a valid non-negative integer.")
        sys.exit(1)

    result = compute_factorial(n)
    print(result)
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLens

```
PS E:\Sem\AI-A-Coding-v2> & "C:\Python310\python.exe" "E:\Users\spuris\vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\handled\1.1.0\debug\Launches\55875" --> "E:\Sem\AI-A-Coding-v2\task3.py"
Usage: python task3.py <non-negative integer>
PS E:\Sem\AI-A-Coding-v2> python task3.py
128
% PS E:\Sem\AI-A-Coding-v2>
```

OUTLINE TIMELINE PROJECTS

Short Note: How Modularity Improves Reusability

Modularity helps in reusability by helping separate logic in terms of different functions which may be reused in multiple programs. The factorial computation is put in a function which makes the code easier to maintain and test. If the logic has to be changed, changes can be made at

one place without having any impact on the whole program. Modular code is also more readable and easier to work on in a team environment.

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

Copilotgenerated programs on the following criteria:

- Logic clarity
 - Reusability
 - Debugging ease
 - Suitability for large projects
 - AI dependency risk
- ❖ Expected Deliverables**

Choose one:

- A comparison table
- OR**
- A short technical report (300–400 words).

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

Task 5: AI-Generated Iterative vs Recursive Thinking

❖ Scenario

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

Criteria	Procedural Code (Without Functions)	Modular Code (With Functions)
Logic Clarity	Logic is written in one continuous flow, which is easy to follow for very small programs but becomes cluttered as code grows.	Logic is clearly separated into functions, making the purpose of each part easier to understand.
Reusability	Code cannot be reused easily because the logic is tightly coupled to the main execution block.	Function-based logic can be reused across multiple scripts by importing or calling the function.
Debugging Ease	Debugging is harder since all logic exists in one block, making it difficult to isolate issues.	Debugging is easier because errors can be traced to specific functions.
Suitability for Large Projects	Not suitable for large projects as it leads to poor organization and low maintainability.	Well suited for large projects due to better structure, scalability, and teamwork support.
AI Dependency Risk	High risk, as beginners may copy AI-generated code without understanding the full flow.	Lower risk, as modular structure encourages understanding of individual components.

❖ 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
- Stack usage
- Performance implications
- When recursion is not recommended.

Task 5: AI-Generated Iterative vs Recursive Thinking

Iterative Thinking –

The screenshot shows the VS Code interface with the following details:

- Explorer View:** Shows a project structure for "AI-A-CODING-V2" containing files: Day1.py, task2.py, task3.py, task5_iterative.py, and task5_recursive.py.
- Code Editor:** Displays the content of `task5_iterative.py`. The code uses an iterative approach with a loop to calculate Factorial by repeatedly multiplying values. It includes error handling for non-negative integers.
- Terminal:** Shows the command `python task5_iterative.py` being run, resulting in the output `120`.
- Status Bar:** Shows indexing completed and other system information.

Recursive thinking –

```

1 # Recursive approach using function calls
2 # The function calls itself until it reaches the base case
3
4 import sys
5
6 def factorial(n):
7     if n == 0 or n == 1:
8         return 1
9     return n * factorial(n - 1)
10
11 if __name__ == "__main__":
12     if len(sys.argv) != 2:
13         print("Usage: python task5_recursive.py <non-negative integer>")
14         sys.exit(1)
15
16     try:
17         n = int(sys.argv[1])
18         if n < 0:
19             raise ValueError
20     except ValueError:
21         print("Please provide a valid non-negative integer.")
22         sys.exit(1)
23
24     print(factorial(n))
25

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLINS
PS E:\sem6\AI-A-coding-v2> python task5_recursive.py 5
120
PS E:\sem6\AI-A-coding-v2>

Aspect	Iterative Approach	Recursive Approach
Readability	Easy to understand for beginners	More mathematical and elegant
Stack Usage	Uses constant memory	Uses additional stack
Performance	Faster and memory efficient	Slower for large inputs
Error Risk	Low	Risk of stack overflow
When Not Recommended	—	Not recommended for large input values

ASSIGNMENT – 1.5

TASK 1: String Reversal without Functions (Procedural)

The screenshot shows the Visual Studio Code interface with a dark theme. The Explorer sidebar on the left lists two files: Factorial.py and String.py. The String.py editor tab is active, displaying the following Python code:

```
#Task 1:String Reversal without Functions (Procedural)
user_input = input("Enter a string: ")
reversed_string = user_input[::-1]
print("Reversed string:", reversed_string)
```

The terminal at the bottom shows the output of running the script:

```
PS C:\Users\suman\OneDrive\Desktop\AIAC_1121> & C:/Users/suman/AppData/Local/Programs/Python/Python312/python.exe c:/Users/suman/OneDrive/Desktop/AIAC_1121/String.py
● Enter a string: SR university
Reversed string: ytisrevinu RS
○ PS C:\Users\suman\OneDrive\Desktop\AIAC_1121>
```

TASK 2: Optimize this code , simplify the logic or make it more readable.

The screenshot shows the Visual Studio Code interface with a dark theme. The Explorer sidebar on the left lists two files: Factorial.py and String.py. The String.py editor tab is active, displaying the following Python code:

```
#Task 2:optimize this code , simplifie the logic or make it more readable
user_input = input("Enter a string: ")
reversed_string = ''.join(reversed(user_input))
print("Reversed string:", reversed_string)
```

The terminal at the bottom shows the output of running the script:

```
PS C:\Users\suman\OneDrive\Desktop\AIAC_1121> & C:/Users/suman/AppData/Local/Programs/Python/Python312/python.exe c:/Users/suman/OneDrive/Desktop/AIAC_1121/String.py
● Enter a string: SR university
Reversed string: ytisrevinu RS
○ PS C:\Users\suman\OneDrive\Desktop\AIAC_1121>
```

TASK 3: String Reversal using Functions.

The screenshot shows the Visual Studio Code interface. In the Explorer sidebar, there are two open files: 'Factorial.py' and 'String.py'. The 'String.py' file contains the following code:

```
#Taskk 3:String Reversal using Functions
def reverse_string(s):
    return s[::-1]
if __name__ == "__main__":
    user_input = input("Enter a string: ")
    print("Reversed string:", reverse_string(user_input))
```

In the Terminal tab, the command `python String.py` is run, and the output is:

```
PS C:\Users\suman\OneDrive\Desktop\AIAC_1121> & C:/Users/suman/AppData/Local/Programs/Python/Python312/python.exe c:/Users/suman/OneDrive/Desktop/AIAC_1121/String.py
● Enter a string: SR university
Reversed string: ytisrevinu RS
○ PS C:\Users\suman\OneDrive\Desktop\AIAC_1121>
```

The status bar at the bottom indicates "Indexing completed. No connection".

TASK 4: Comparative Analysis – Procedural VS Modular Approach.

Procedural Approach (Without Functions):

The string reversal logic is implemented directly in the main code. While this approach is simple and easy to understand for small programs, it lacks reusability and scalability. Debugging becomes difficult as the program grows because all logic is tightly coupled.

Modular Approach (With Functions):

The function-based implementation separates logic from execution, improving code readability and structure. The function can be reused in multiple parts of an application, making it suitable for large-scale systems. Debugging and maintenance are easier due to isolated logic.

TASK 5: Iterative vs Recursive Fibonacci Approach.

The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. The top bar includes File, Edit, Selection, View, Go, Run, and other standard menu items. The title bar displays "Q_AIAC_1121". The left sidebar has sections for Explorer, Open Editors, Outline, Timeline, and Projects. The main area shows two open files: "Factorial.py" and "String.py". The "String.py" file is currently active and contains the following code:

```
#Task 4:Iterative vs Recursive Fibonacci Approach
def reverse_string_iterative(s):
    reversed_str = ''
    for char in s:
        reversed_str = char + reversed_str
    return reversed_str
user_input = input("Enter a string: ")
print("Reversed string (Iterative):", reverse_string_iterative(user_input))

def reverse_string_recursive(s):
    if len(s) == 0:
        return s
    else:
        return s[-1] + reverse_string_recursive(s[:-1])
user_input = input("Enter a string: ")
print("Reversed string (Recursive):", reverse_string_recursive(user_input))
```

The bottom right corner of the code editor shows "Python 3.12.0". Below the code editor is the terminal window, which displays the command "C:/Users/suman/AppData/Local/Programs/Python/Python312/python.exe c:/Users/suman/OneDrive/Desktop/AIAC_1121/String.py" and its output:

```
PS C:\Users\suman\OneDrive\Desktop\AIAC_1121> & C:/Users/suman/AppData/Local/Programs/Python/Python312/python.exe c:/Users/suman/OneDrive/Desktop/AIAC_1121/String.py
● Enter a string: SR university
Reversed string (Iterative): ytisrevinu RS
Enter a string: SR university
Reversed string (Recursive): ytisrevinu RS
○ PS C:\Users\suman\OneDrive\Desktop\AIAC_1121>
```

The status bar at the bottom indicates "Ln 17, Col 76" and "Spaces: 4".

THANK YOU!!