

AI Assisted Coding

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batch 04

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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.

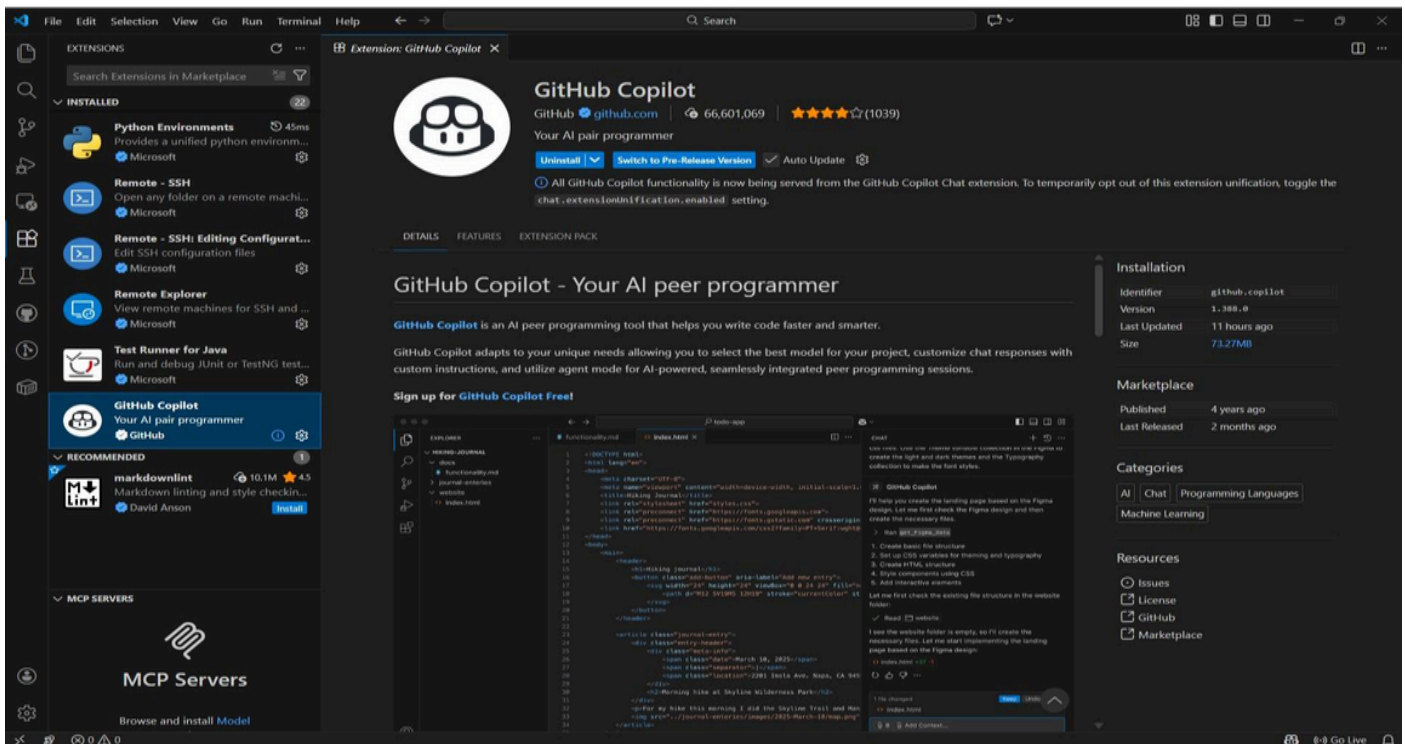
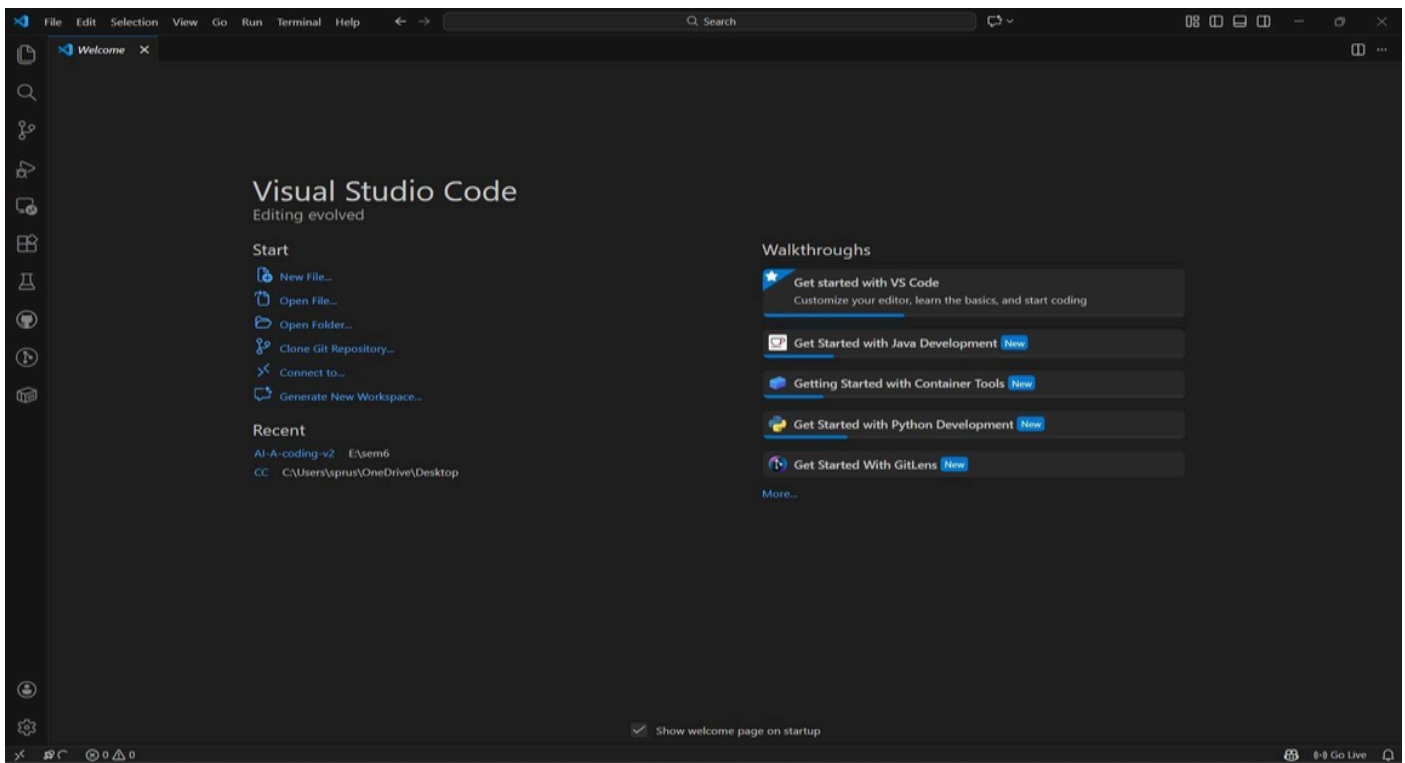
Task 0

- 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 0: 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.

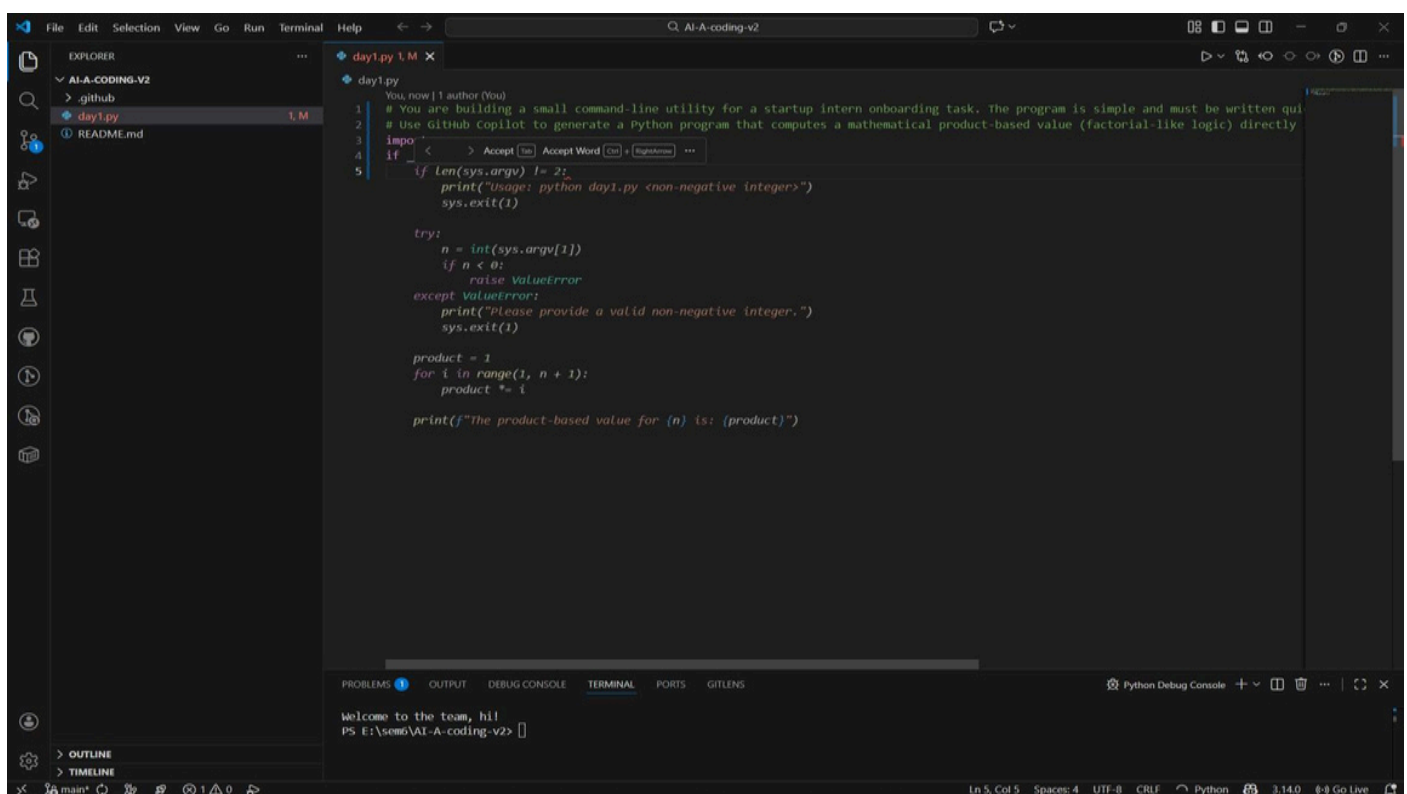
- Constraint:

- 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)



```
File Edit Selection View Go Run Terminal Help
AI-A-coding-v2
day1.py 1 M
day1.py
README.md
You, now | I author (You)
# You are building a small command-line utility for a startup intern onboarding task. The program is simple and must be written quickly.
# 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.
import sys
if len(sys.argv) != 2:
    print("Usage: python day1.py <non-negative integer>")
    sys.exit(1)

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

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

print(f"The product-based value for {n} is: {product}")

Welcome to the team, hi!
PS E:\sem6\AI-A-coding-v2>
```

The screenshot shows a Visual Studio Code editor window with a file named `day1.py` open. The code is a Python script that calculates the product of integers from 1 to `n`. It includes a docstring, a usage message, and error handling for non-negative integers. The terminal at the bottom shows the command `python day1.py 5` being executed, resulting in the output: `The product-based value for 5 is: 120`.

```
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)
8
9     try:
10         n = int(sys.argv[1])
11         if n < 0:
12             raise ValueError
13     except ValueError:
14         print("Please provide a valid non-negative integer.")
15         sys.exit(1)
16
17     product = 1
18     for i in range(1, n + 1):
19         product *= i
20
21     print(f"The product-based value for {n} is: {product}")
22
```

Terminal Output:

```
PS E:\seme\AI-A-coding-v2> & 'c:\Python314\python.exe' 'c:\Users\sprus\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '52393' '-' 'e:\seme\AI-A-coding-v2\day1.py'
Usage: python day1.py <non-negative integer>
PS E:\seme\AI-A-coding-v2> python day1.py 5
The product-based value for 5 is: 120
PS E:\seme\AI-A-coding-v2>
```

Task 2: AI Code Optimization C 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

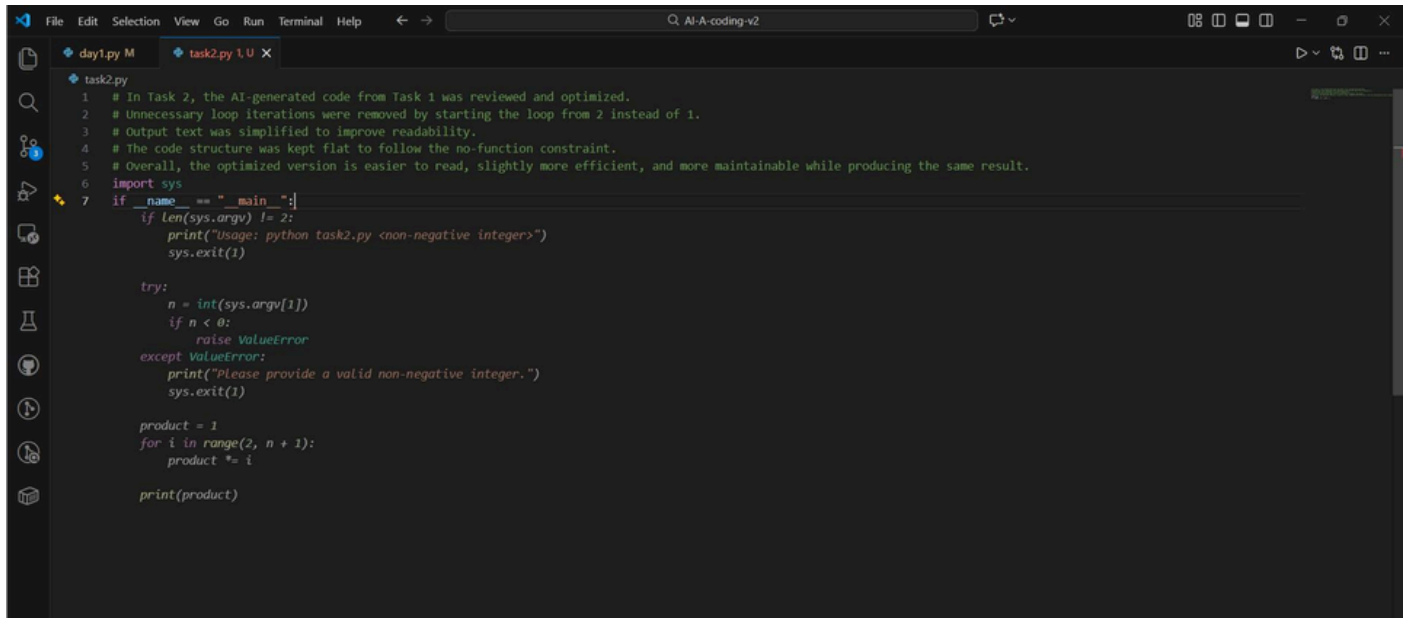
- Original AI-generated code
- Optimized version of the same code

➤ Side-by-side comparison

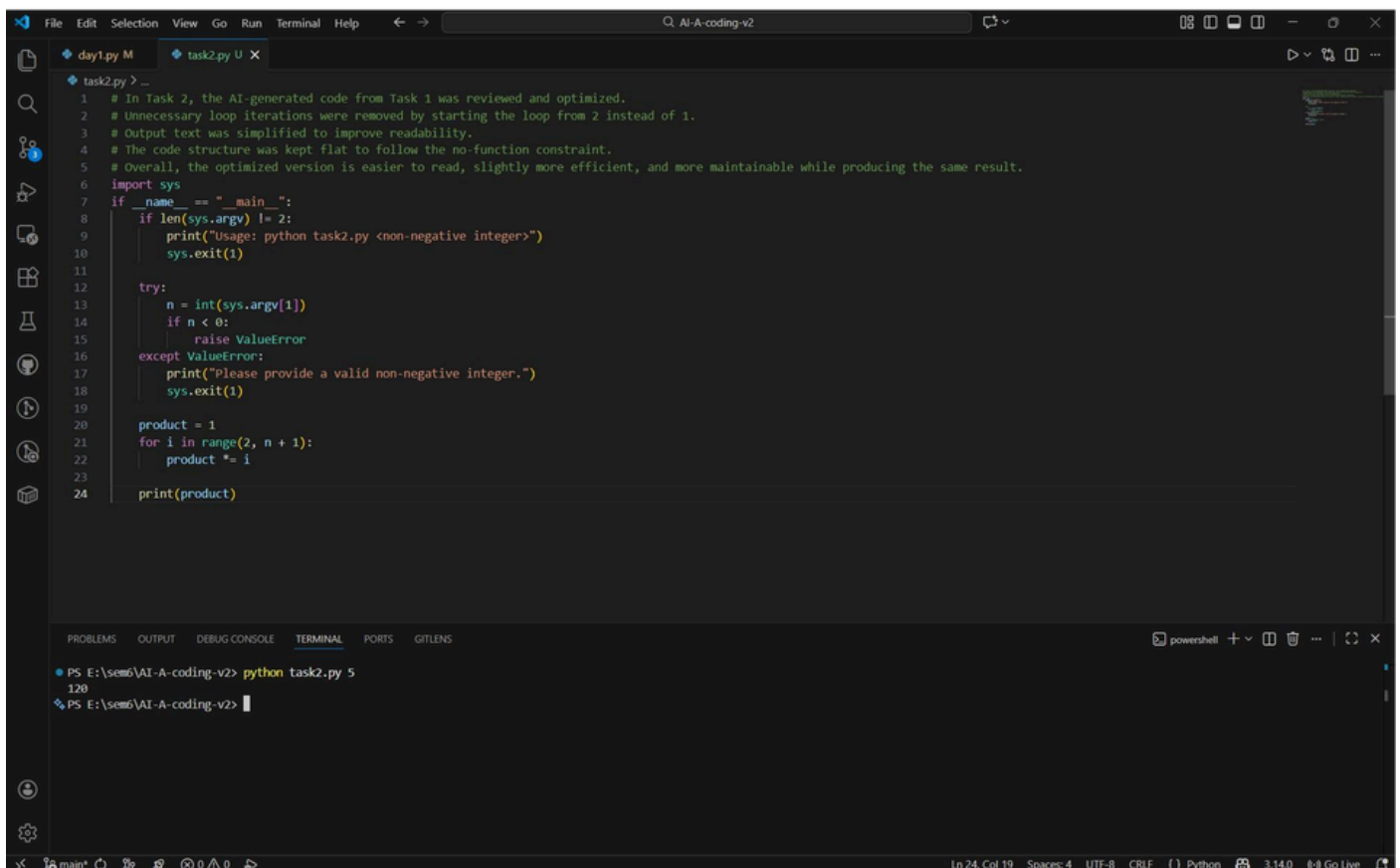
➤ Written explanation:

- What was improved?
- Why the new version is better (readability, performance, maintainability).

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



```
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 import sys
7 if __name__ == "__main__":
8     if len(sys.argv) != 2:
9         print("Usage: python task2.py <non-negative integer>")
10        sys.exit(1)
11
12    try:
13        n = int(sys.argv[1])
14        if n < 0:
15            raise ValueError
16    except ValueError:
17        print("Please provide a valid non-negative integer.")
18        sys.exit(1)
19
20    product = 1
21    for i in range(2, n + 1):
22        product *= i
23
24    print(product)
```



```
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 import sys
7 if __name__ == "__main__":
8     if len(sys.argv) != 2:
9         print("Usage: python task2.py <non-negative integer>")
10        sys.exit(1)
11
12    try:
13        n = int(sys.argv[1])
14        if n < 0:
15            raise ValueError
16    except ValueError:
17        print("Please provide a valid non-negative integer.")
18        sys.exit(1)
19
20    product = 1
21    for i in range(2, n + 1):
22        product *= i
23
24    print(product)
```

```
PS E:\sem6\AI-A-coding-v2> python task2.py 5
120
PS E:\sem6\AI-A-coding-v2>
```

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

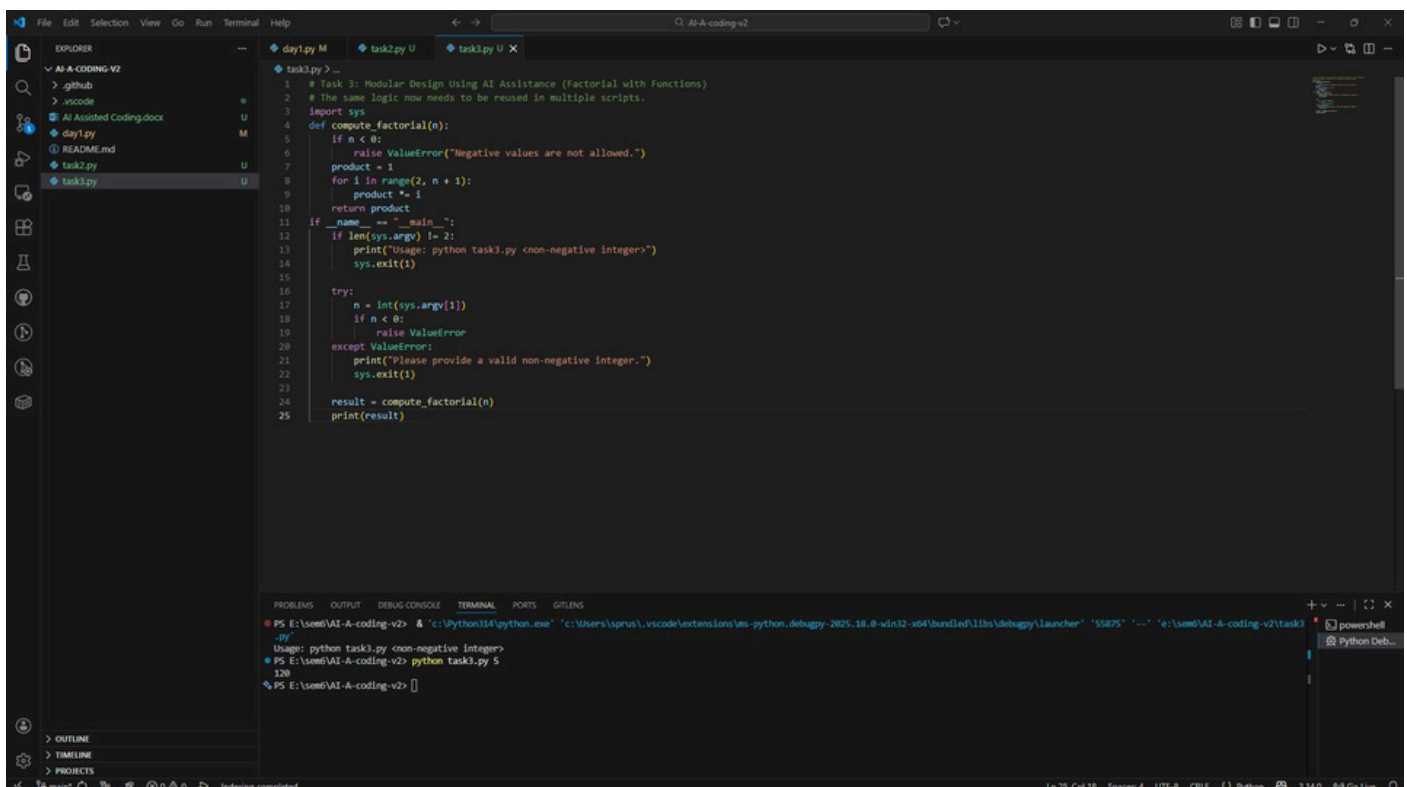
❖ Constraints

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.



```
1 # Task 3: Modular Design Using AI Assistance (Factorial with Functions)
2 # The same logic now needs to be reused in multiple scripts.
3 import sys
4 def compute_factorial(n):
5     if n < 0:
6         raise ValueError("Negative values are not allowed.")
7     product = 1
8     for i in range(2, n + 1):
9         product *= i
10    return product
11 if __name__ == "__main__":
12     if len(sys.argv) != 2:
13         print("Usage: python task3.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     result = compute_factorial(n)
25     print(result)
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GIT LENS

```
PS E:\sem6\AI-A-coding-v2> & "c:\Python114\python.exe" "c:\Users\sprus\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle\libs\debugpy\launcher" "55875" "-..." "e:\sem6\AI-A-coding-v2\task3.py"
Usage: python task3.py <non-negative integer>
PS E:\sem6\AI-A-coding-v2> python task3.py 5
120
PS E:\sem6\AI-A-coding-v2>
```

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 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

OR

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

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

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 harder to understand as complexity increases.	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 flow.	Functions can be reused across multiple scripts by importing and calling the function.
Debugging Ease	Debugging is harder because all logic exists in one block, making it difficult to isolate issues.	Issues can be traced to specific functions.
Suitability for Large Projects	Well suited for large projects due to better structure, scalability, and low maintainability.	Not suitable for large projects as it leads to better maintainability, scalability, and low teamwork support.
Risk	Lower risk, as modular structure encourages understanding of individual components.	High risk, as beginners may copy AI-generated code without understanding the full flow.

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

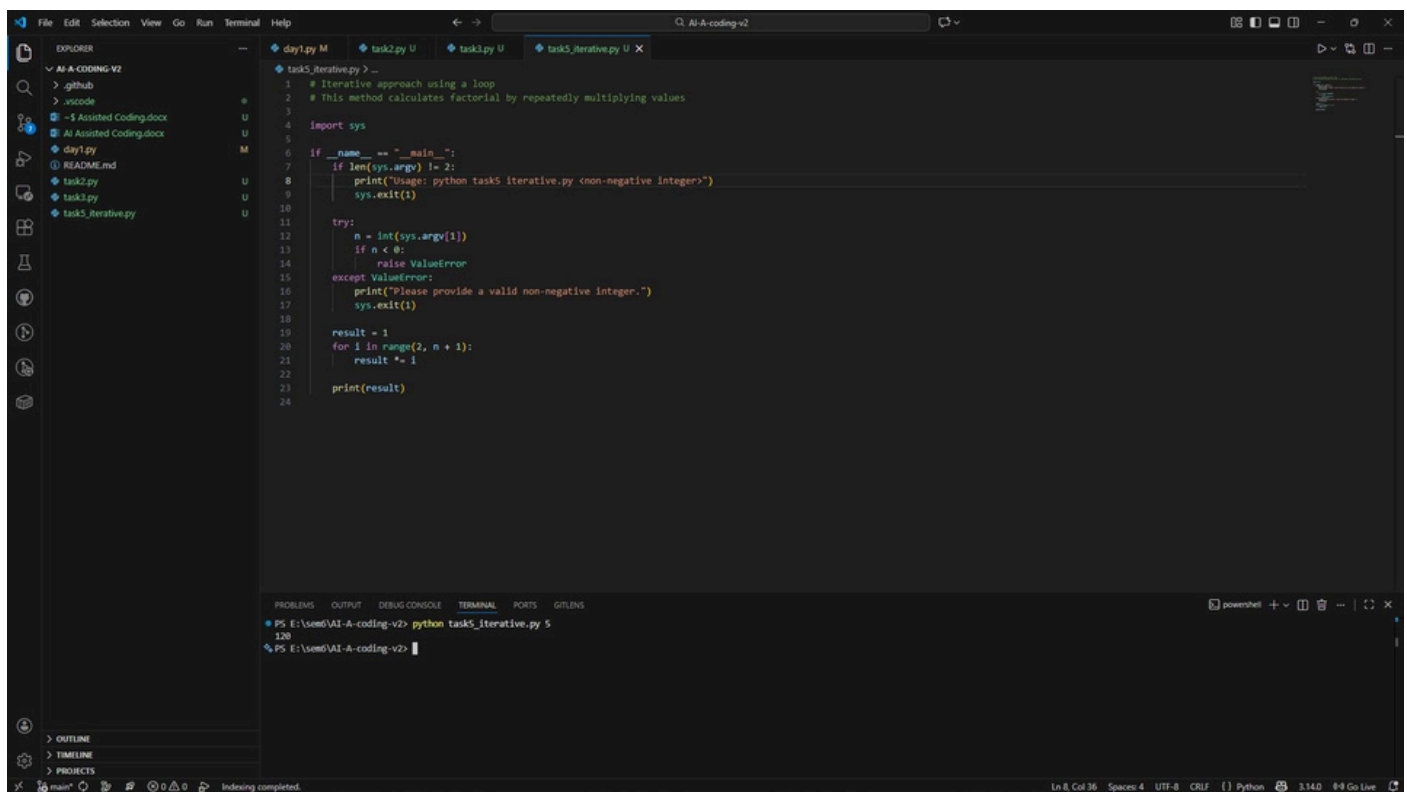
Execution flow explanation (in your own words)

Comparison covering:

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

Task 5: AI-Generated Iterative vs Recursive Thinking

Iterative Thinking -



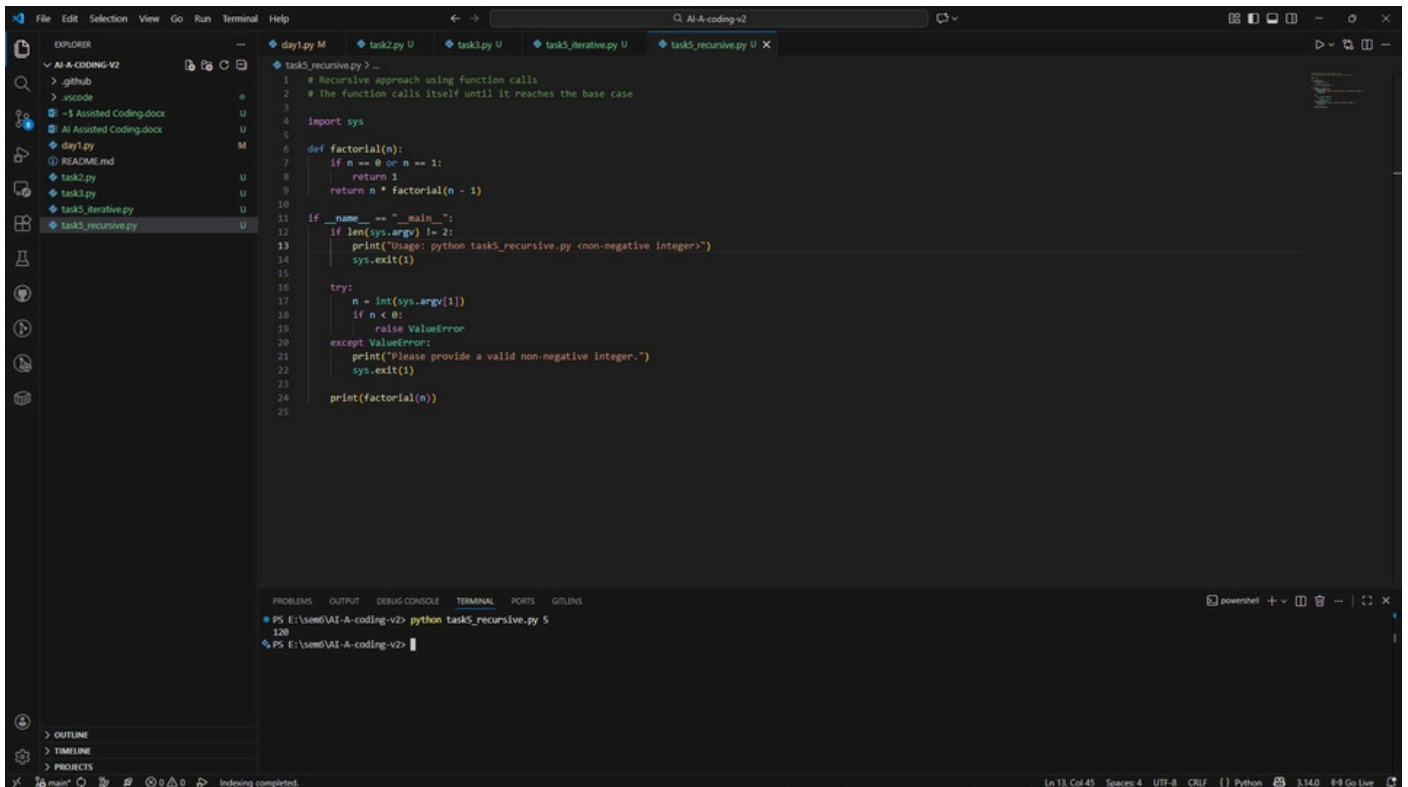
The screenshot shows a Visual Studio Code editor window with a file explorer on the left and a code editor in the center. The file explorer shows a project named 'AI-A-CODING-V2' with files like 'github', 'vscode', 'Assisted Coding.docx', 'day1.py', 'README.md', 'task2.py', 'task3.py', and 'task5_iterative.py'. The code editor displays the content of 'task5_iterative.py', which is a Python script for calculating factorial iteratively. The script includes comments, imports, a main function, and a loop to calculate the factorial. The terminal at the bottom shows the command 'python task5_iterative.py 5' being executed, resulting in the output '120'.

```
1 # Iterative approach using a loop
2 # This method calculates factorial by repeatedly multiplying values
3
4 import sys
5
6 if __name__ == "__main__":
7     if len(sys.argv) != 2:
8         print("Usage: python task5_iterative.py <non-negative integer>")
9         sys.exit(1)
10
11     try:
12         n = int(sys.argv[1])
13         if n < 0:
14             raise ValueError
15     except ValueError:
16         print("Please provide a valid non-negative integer.")
17         sys.exit(1)
18
19     result = 1
20     for i in range(2, n + 1):
21         result *= i
22
23     print(result)
24
```

Terminal output:

```
PS E:\sem0\AI-A-coding-v2> python task5_iterative.py 5
120
PS E:\sem0\AI-A-coding-v2>
```

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
```

PS E:\sem5\AI-A-coding-v2> python task5_recursive.py 5

120

PS E:\sem5\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 memory
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

AI Assisted Coding

nishath afroze

batch 04

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09-01-2026

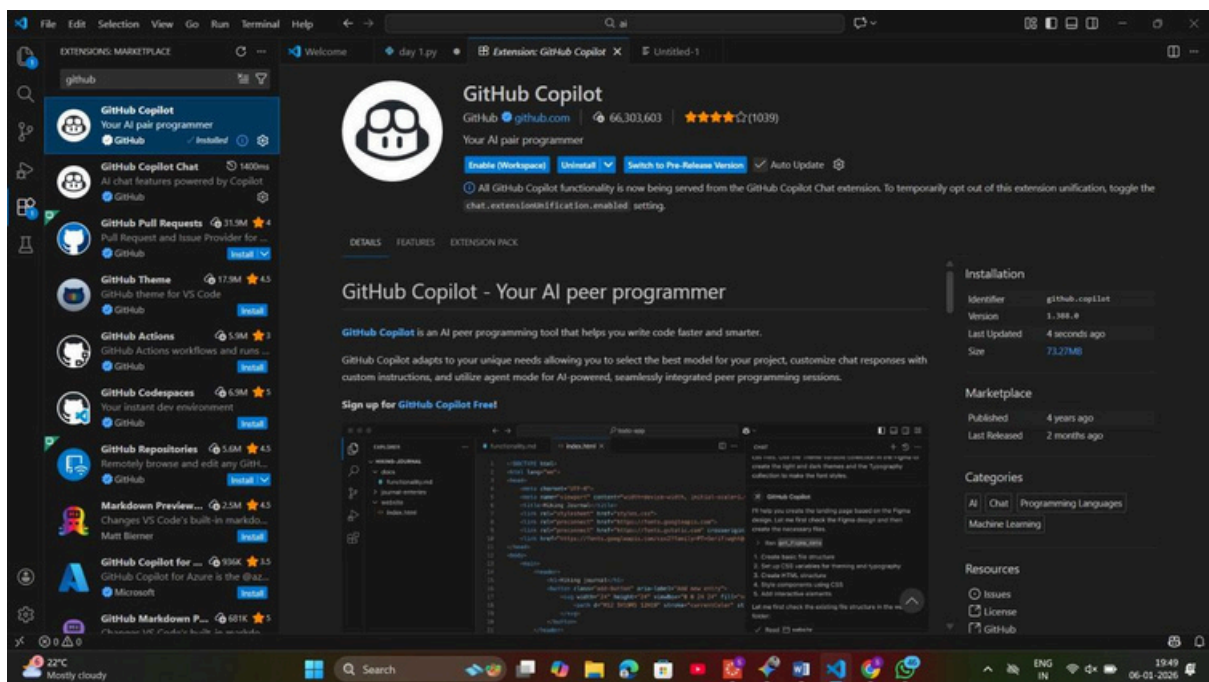
Task 0: Environment Setup:-

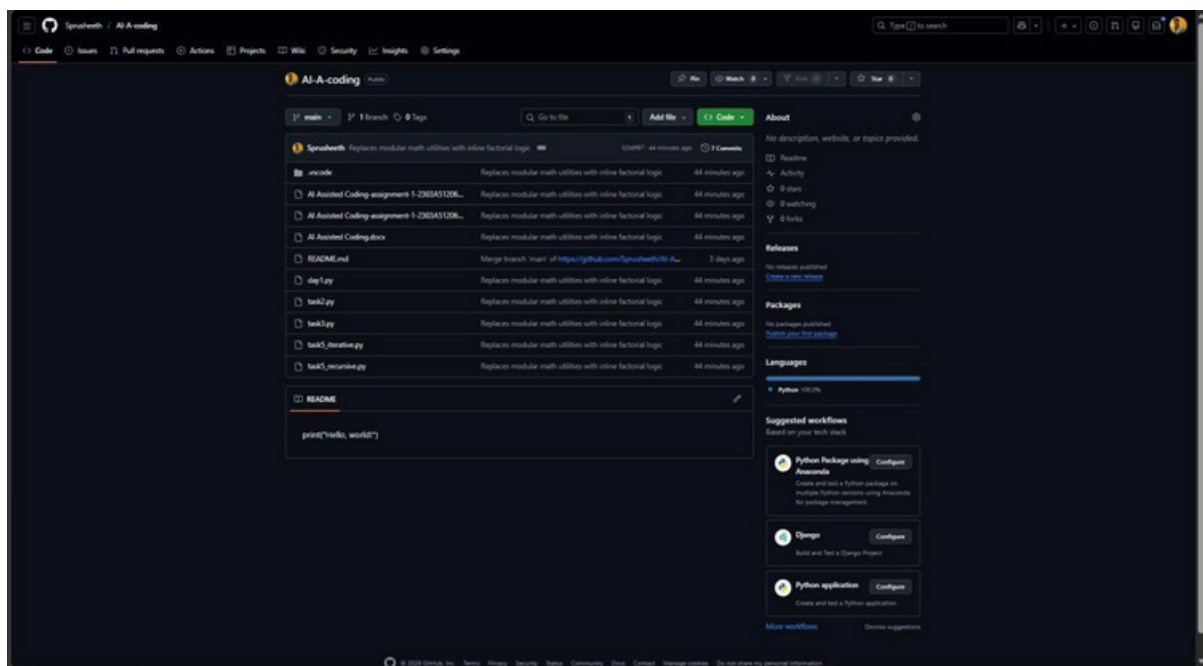
Task 0

- 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: Non-Modular Logic (Factorial):-

: AI-Generated Logic Without Modularization (String Reversal Without Functions)

❖ Scenario

You are developing a basic text-processing utility for a messaging application.

❖ Task Description

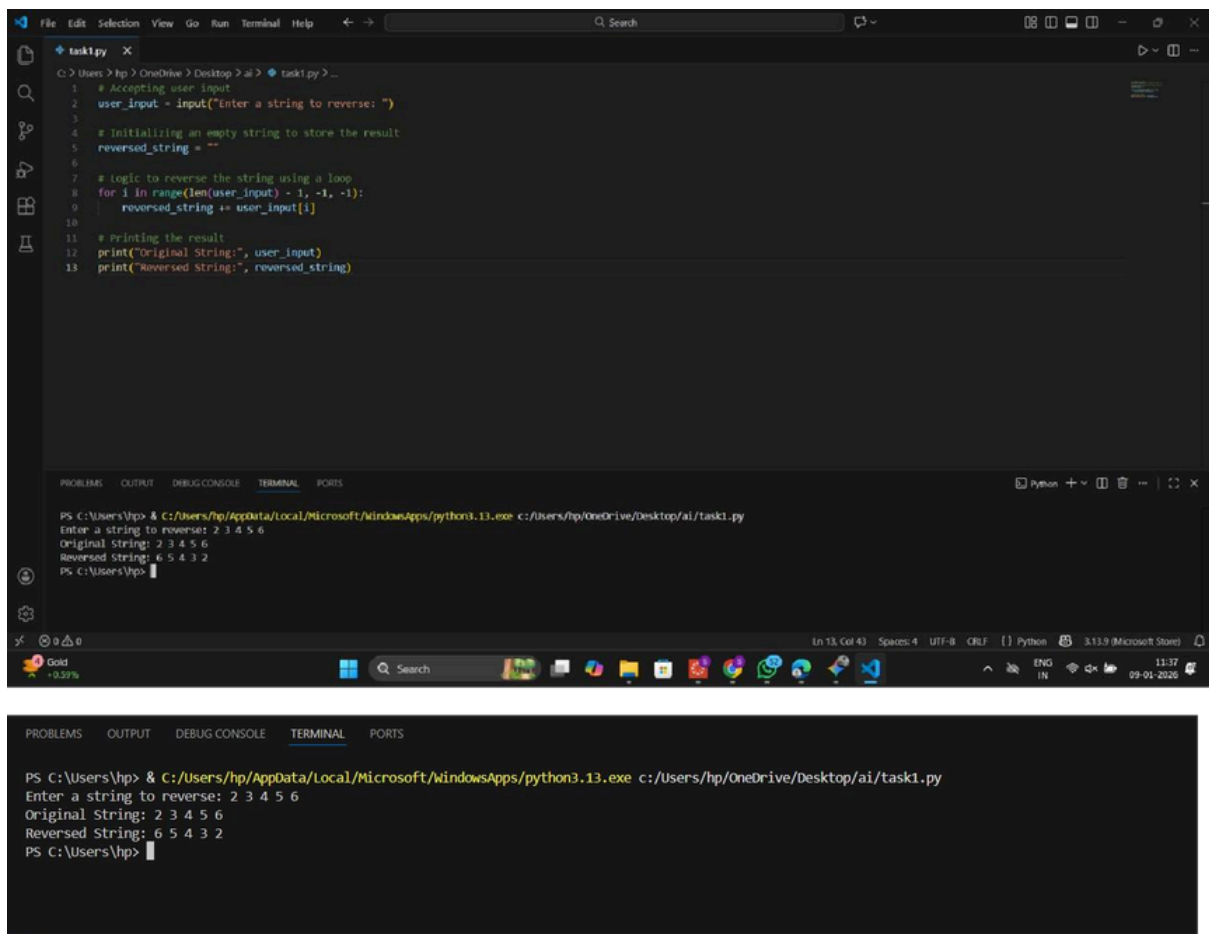
Use GitHub Copilot to generate a Python program that:

- Reverses a given string
- Accepts user input
- Implements the logic directly in the main code
- Does not use any user-defined functions

❖ Expected Output

- Correct reversed string
- Screenshots showing Copilot-generated code suggestions

➤ Sample inputs and outputs



The image shows a VS Code editor window with a Python file named `task1.py`. The script prompts the user to enter a string to reverse. The terminal output shows the user entering "2 3 4 5 6", and the program printing the original and reversed strings.

```
1 # Accepting user input
2 user_input = input("Enter a string to reverse: ")
3
4 # Initializing an empty string to store the result
5 reversed_string = ""
6
7 # Logic to reverse the string using a loop
8 for i in range(len(user_input) - 1, -1, -1):
9     reversed_string += user_input[i]
10
11 # Printing the result
12 print("Original String:", user_input)
13 print("Reversed String:", reversed_string)
```

Terminal Output:

```
PS C:\Users\hp> & C:/Users/hp/AppData/Local/Microsoft/WindowsApps/python3.13.exe c:/Users/hp/OneDrive/Desktop/ai/task1.py
Enter a string to reverse: 2 3 4 5 6
Original String: 2 3 4 5 6
Reversed String: 6 5 4 3 2
PS C:\Users\hp>
```

Task 2: AI Code Optimization:- Efficiency s Logic Optimization (Readability Improvement)

❖ Scenario

The code will be reviewed by other developers.

❖ Task Description

Examine the Copilot-generated code from Task 1 and improve it by:

- Removing unnecessary variables
- Simplifying loop or indexing logic
- Improving readability
- Use Copilot prompts like:
 - “Simplify this string reversal code”
 - “Improve readability and efficiency”

Hint:

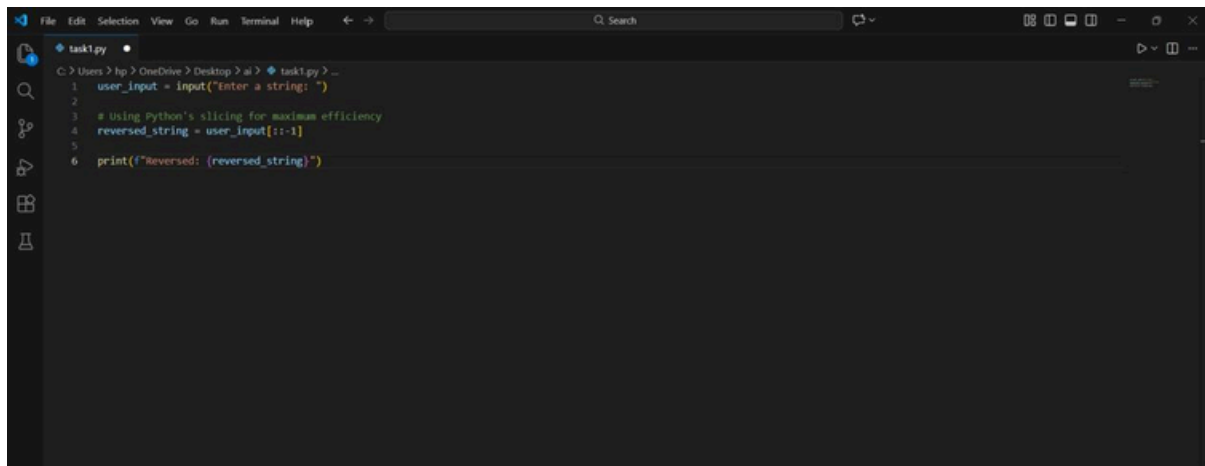
Prompt Copilot with phrases like

“optimize this code”, “simplify logic”, or “make it more readable”

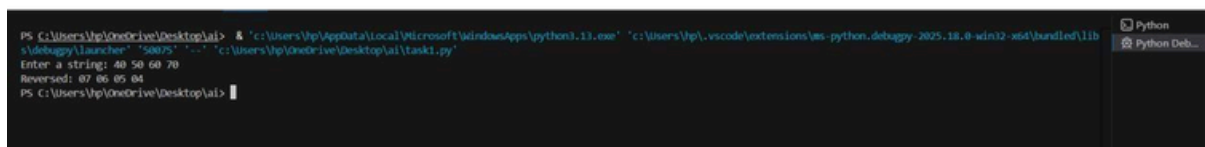
❖ Expected Output

➤ Original and optimized code versions

➤ Explanation of how the improvements reduce time complexity



```
task1.py
C:\Users\hp> hp > OneDrive > Desktop > ai > task1.py > ...
1 user_input = input("Enter a string: ")
2
3 # Using Python's slicing for maximum efficiency
4 reversed_string = user_input[::-1]
5
6 print(f"Reversed: {reversed_string}")
```



```
PS C:\Users\hp\OneDrive\Desktop\ai> & 'c:\Users\hp\AppData\Local\Microsoft\WindowsApps\python11.exe' 'c:\Users\hp\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle\lib
s\debugpy\launcher' '50075' '-.' 'c:\Users\hp\OneDrive\Desktop\ai\task1.py'
Enter a string: 50075
Reversed: 50075
PS C:\Users\hp\OneDrive\Desktop\ai>
```

Task 3: Modular Design Using AI Assistance (String Reversal Using Functions)

❖ Scenario

The string reversal logic is needed in multiple parts of an application.

❖ Task Description

Use GitHub Copilot to generate a function-based Python program that:

➤ Uses a user-defined function to reverse a string

➤ Returns the reversed string

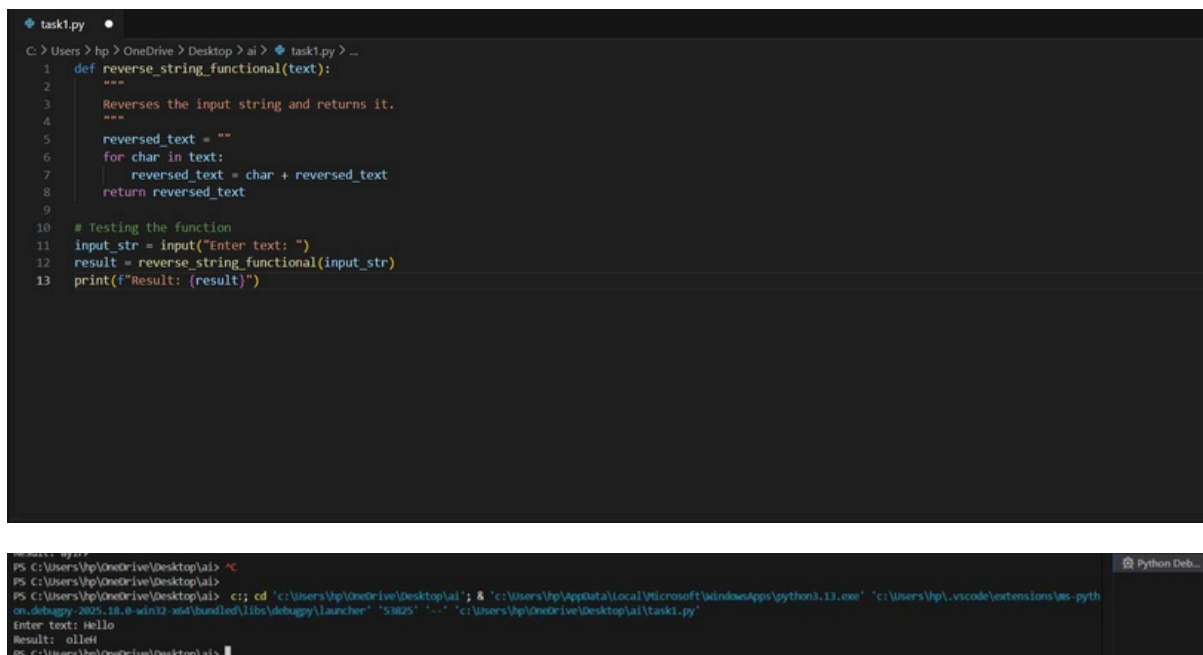
➤ Includes meaningful comments (AI-assisted)

❖ Expected Output

➤ Correct function-based implementation

➤ Screenshots documenting Copilot’s function generation

➤ Sample test cases and outputs



The image shows a code editor window with a file named `task1.py`. The code defines a function `reverse_string_functional(text)` that reverses a string by iterating through its characters and building a new string. It then tests the function by taking user input and printing the result.

```
1 def reverse_string_functional(text):
2     """
3     Reverses the input string and returns it.
4     """
5     reversed_text = ""
6     for char in text:
7         reversed_text = char + reversed_text
8     return reversed_text
9
10 # Testing the function
11 input_str = input("Enter text: ")
12 result = reverse_string_functional(input_str)
13 print(f"Result: {result}")
```

Below the code editor, a terminal window shows the execution of the script. The user enters "Hello", and the program outputs "olleH".

```
PS C:\Users\hp\OneDrive\Desktop\ai> cd "C:\Users\hp\OneDrive\Desktop\ai" & & "c:\Users\hp\AppData\Local\Microsoft\WindowsApps\python3.13.exe" "c:\Users\hp\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle\libs\debugpy\launcher" "53825" "-" "c:\Users\hp\OneDrive\Desktop\ai\task1.py"
Enter text: Hello
Result: olleH
PS C:\Users\hp\OneDrive\Desktop\ai>
```

Task 4: Comparative Analysis - Procedural vs Modular Approach (With vs Without Functions)

❖ Scenario

You are asked to justify design choices during a code review.

❖ Task Description

Compare the Copilot-generated programs:

- Without functions (Task 1)
- With functions (Task 3) Analyze them based on:
 - Code clarity
 - Reusability
 - Debugging ease
 - Suitability for large-scale applications

❖ Expected Output

Comparison table or short analytical report

Feature	Procedural (Without Functions)	Modular (With Functions)
Code Clarity	Easy for tiny scripts; messy for large ones.	Very high; logic is isolated and named.
Reusability	Must copy-paste code to use it again.	Can be called anywhere in the app.
Debugging	Harder to isolate where an error occurs. Not suitable for large	Easy to unit test the specific function. Essential for professional
Scalability	applications.	development.

Task 5: AI-Generated Iterative vs Recursive Fibonacci Approaches (Different Algorithmic Approaches to String Reversal)

❖ Scenario

Your mentor wants to evaluate how AI handles alternative logic paths.

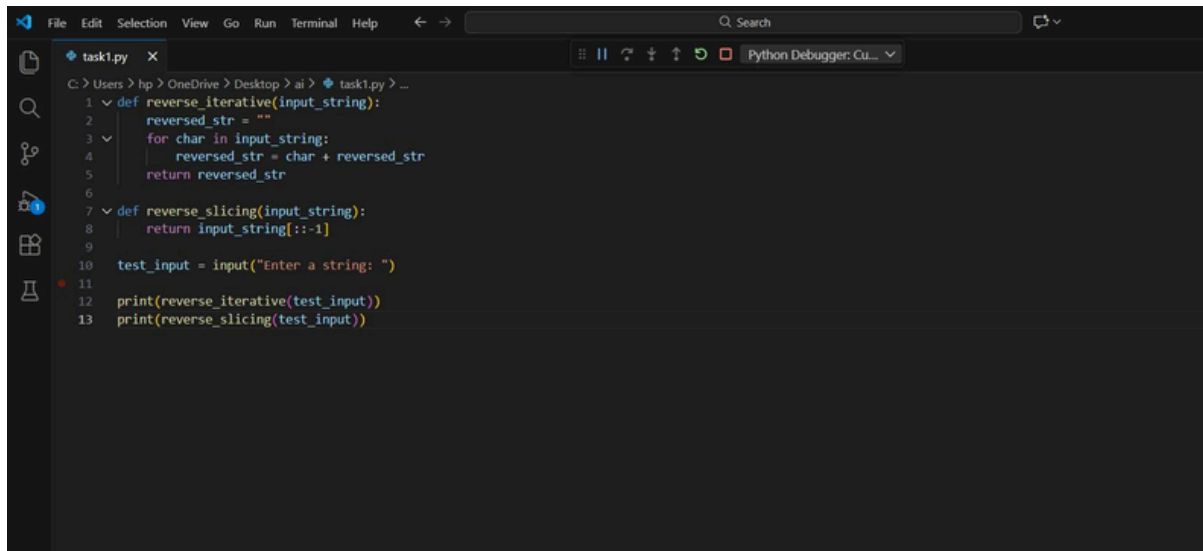
❖ Task Description

Prompt GitHub Copilot to generate:

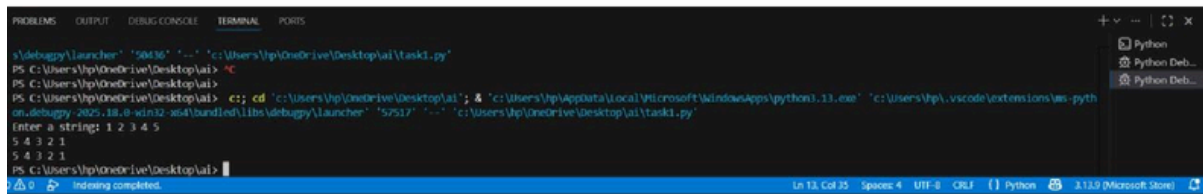
- A loop-based string reversal approach
- A built-in / slicing-based string reversal approach

❖ Expected Output

- Two correct implementations
- Comparison discussing:
 - Execution flow
 - Time complexity
 - Performance for large inputs
 - When each approach is appropriate.



```
task1.py
1 def reverse_iterative(input_string):
2     reversed_str = ""
3     for char in input_string:
4         reversed_str = char + reversed_str
5     return reversed_str
6
7 def reverse_slicing(input_string):
8     return input_string[::-1]
9
10 test_input = input("Enter a string: ")
11
12 print(reverse_iterative(test_input))
13 print(reverse_slicing(test_input))
```



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Python
Python Deb...
Python Deb...

> debugpy\launcher -s 59436 -t -c "c:\Users\hp\OneDrive\Desktop\ai\task1.py"
PS C:\Users\hp\OneDrive\Desktop\ai> ^C
PS C:\Users\hp\OneDrive\Desktop\ai>
PS C:\Users\hp\OneDrive\Desktop\ai> c:: cd "c:\Users\hp\OneDrive\Desktop\ai"; & "c:\Users\hp\AppData\Local\Microsoft\WindowsApps\python1.13.exe" "c:\Users\hp\OneDrive\Desktop\ai\task1.py"
Enter a string: 1 2 3 4 5
5 4 3 2 1
1 2 3 4 5
PS C:\Users\hp\OneDrive\Desktop\ai>
```