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Batch: 26

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 – <i>GitHub Copilot and VS Code Integration + Understanding AI-assisted Coding Workflow</i>		Week1 - Monday

**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:

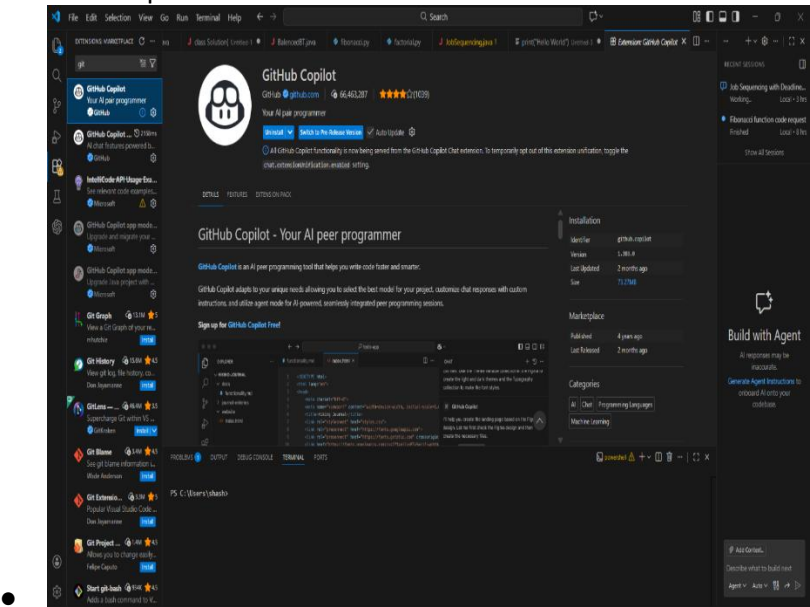
- Set up GitHub Copilot in VS Code successfully.
- Use inline comments and context to generate code with Copilot.
- Evaluate AI-generated code for correctness and readability.
- Compare code suggestions based on different prompts and programming styles.

**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.



	<p>Task 1: AI-Generated Logic Without Modularization (Factorial without Functions)</p> <ul style="list-style-type: none"> <li>• <b>Scenario</b> You are building a <b>small command-line utility</b> for a startup intern onboarding task. The program is simple and must be written quickly without modular design.</li> <li>• <b>Task Description</b> 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.</li> <li>• <b>Constraint:</b> <ul style="list-style-type: none"> <li>➤ Do not define any custom function</li> <li>➤ Logic must be implemented using loops and variables only</li> </ul> </li> <li>• <b>Expected Deliverables</b> <ul style="list-style-type: none"> <li>➤ A working Python program generated with Copilot assistance</li> <li>➤ Screenshot(s) showing: <ul style="list-style-type: none"> <li>➤ The prompt you typed</li> <li>➤ Copilot's suggestions</li> <li>➤ Sample input/output screenshots</li> </ul> </li> <li>➤ Brief reflection (5–6 lines): <ul style="list-style-type: none"> <li>➤ How helpful was Copilot for a beginner?</li> <li>➤ Did it follow best practices automatically?</li> </ul> </li> </ul> </li> </ul>	

	<pre>C:\&gt; java saves &gt; task1.py &gt; ... 1  # Simple command-line program to compute factorial of a number n 2  # Use a loop to calculate n! without any functions 3  # Take input from user, print result 4  n = int(input("Enter a number: ")) 5  result = 1 6  for i in range(1, n + 1): 7      result *= i 8  print(f"The factorial of {n} is {result}")</pre> <p>PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS</p> <pre>path was included, verify that the path is correct and try again. At line:1 char:1 + conda activate Shashidhar + ~~~~~ + CategoryInfo          : ObjectNotFound: (conda:String) [], CommandNotFoundException + FullyQualifiedErrorId : CommandNotFoundException  PS C:\java saves&gt; &amp; 'c:\Users\shash\anaconda3\envs\Shashidhar\python.exe' 'c:\User ed\libs\debugpy\launcher' '50660' '--' 'c:\java saves\task1.py' Enter a number: 5 The factorial of 5 is 120 PS C:\java saves&gt;</pre>	
	<p>Task 2: AI Code Optimization &amp; Cleanup (Improving Efficiency)</p> <p>❖ <b>Scenario</b></p> <p>Your team lead asks you to <b>review AI-generated code</b> before committing it to a shared repository.</p> <p>❖ <b>Task Description</b></p> <p>Analyze the code generated in <b>Task 1</b> and use Copilot again to:</p> <ul style="list-style-type: none"><li>➤ Reduce unnecessary variables</li><li>➤ Improve loop clarity</li><li>➤ Enhance readability and efficiency</li></ul> <p>Hint:</p> <p>Prompt Copilot with phrases like “optimize this code”, “simplify logic”, or “make it more readable”</p> <p>❖ <b>Expected Deliverables</b></p> <ul style="list-style-type: none"><li>➤ Original AI-generated code</li><li>➤ Optimized version of the same code</li><li>➤ Side-by-side comparison</li><li>➤ Written explanation:<ul style="list-style-type: none"><li>▪ What was improved?</li><li>▪ Why the new version is better (readability, performance, maintainability).</li><li>▪</li><li>▪</li></ul></li></ul>	

```
> java saves > task1.py > ...
1 # Optimized factorial computation
2 n = int(input("Enter a number: "))
3 fact = 1
4 for num in range(1, n + 1):
5     fact *= num
6 print(f"Factorial of {n}: {fact}")5

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS C:\java saves> & 'c:\Users\shash\anaconda3\envs\Shash
cd\libs\debugpy\launcher' '50660' '--' 'c:\java saves\tas
Enter a number: 5
The factorial of 5 is 120
PS C:\java saves> ^C
PS C:\java saves>
PS C:\java saves> c;; cd 'c:\java saves'; & 'c:\Users\sh
025.18.0-win32-x64\bundled\libs\debugpy\launcher' '49935'
Enter a number: 5
Factorial of 5: 120
PS C:\java saves>
```

### 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
- Screenshots showing:
  - Prompt evolution
  - Copilot-generated function logic
- Sample inputs/outputs
- Short note:

- How modularity improves reusability.
- 

```

C:\> java saves > task1.py > ...
1 def factorial(n):
2     """Compute factorial of n using iteration."""
3     if n < 0:
4         return None # Handle negative input
5     result = 1
6     for i in range(1, n + 1):
7         result *= i # Multiply incrementally
8     return result
9
10 # Main execution
11 if __name__ == "__main__":
12     n = int(input("Enter a number: "))
13     fact = factorial(n)
14     if fact is not None:
15         print(f"Factorial of {n}: {fact}")
16     else:
17         print("Invalid input: Factorial not defined for negative numbers.")

```

```

PS C:\java saves>
PS C:\java saves> c:; cd 'c:\java saves'; & 'c:\Users\shash\anaconda3\envs\Shashidhar\python.exe' 'c:\025.18.0-win32-x64\bundle\libs\debugpy\launcher' '57609' '--' 'c:\java saves\task1.py'
Enter a number: 5
Factorial of 5: 120
PS C:\java saves> ^C
PS C:\java saves>
PS C:\java saves> c:; cd 'c:\java saves'; & 'c:\Users\shash\anaconda3\envs\Shashidhar\python.exe' 'c:\025.18.0-win32-x64\bundle\libs\debugpy\launcher' '57635' '--' 'c:\java saves\task1.py'
Enter a number: -3
Invalid input: Factorial not defined for negative numbers.
PS C:\java saves>

```

#### 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**

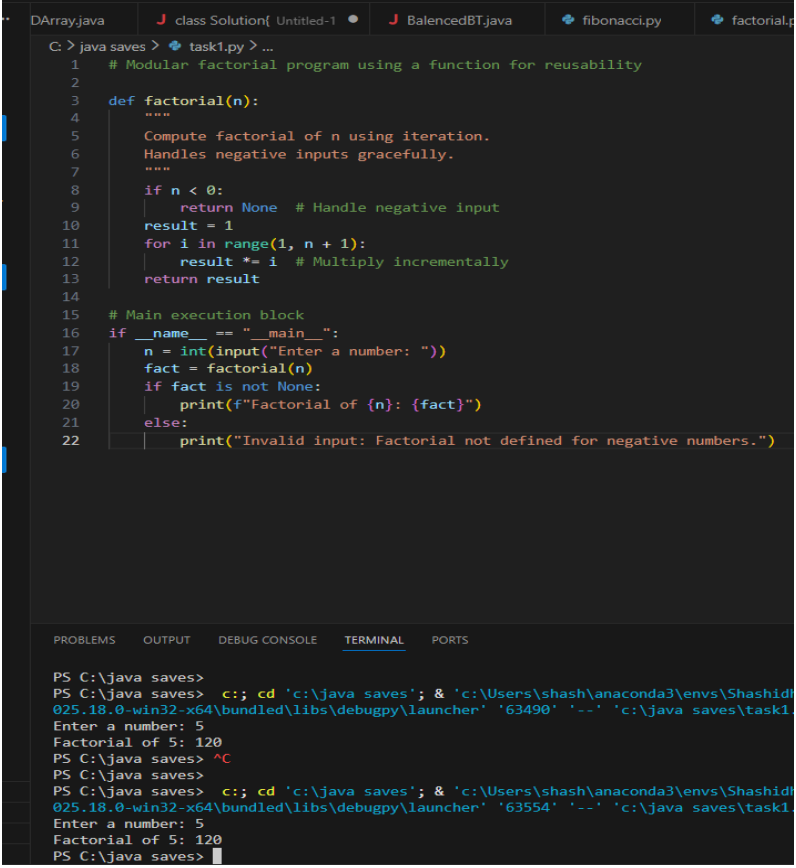
➤ A short technical report (300–400 words).

```
View Go Run Terminal Help ← → 🔍 Search
... DArray.java class Solution[ Untitled-1 ] BalancedBT.java fibonacci.py factorial.py

C:\> java saves > task1.py > ...
1 # Optimized procedural factorial computation (no functions)
2 # Computes factorial inline for quick utility
3
4 n = int(input("Enter a number: "))
5
6 # Check for invalid input
7 if n < 0:
8     print("Invalid input: Factorial not defined for negative numbers.")
9 else:
10     fact = 1
11     for num in range(1, n + 1):
12         fact *= num # Multiply incrementally
13     print(f"Factorial of {n}: {fact}")

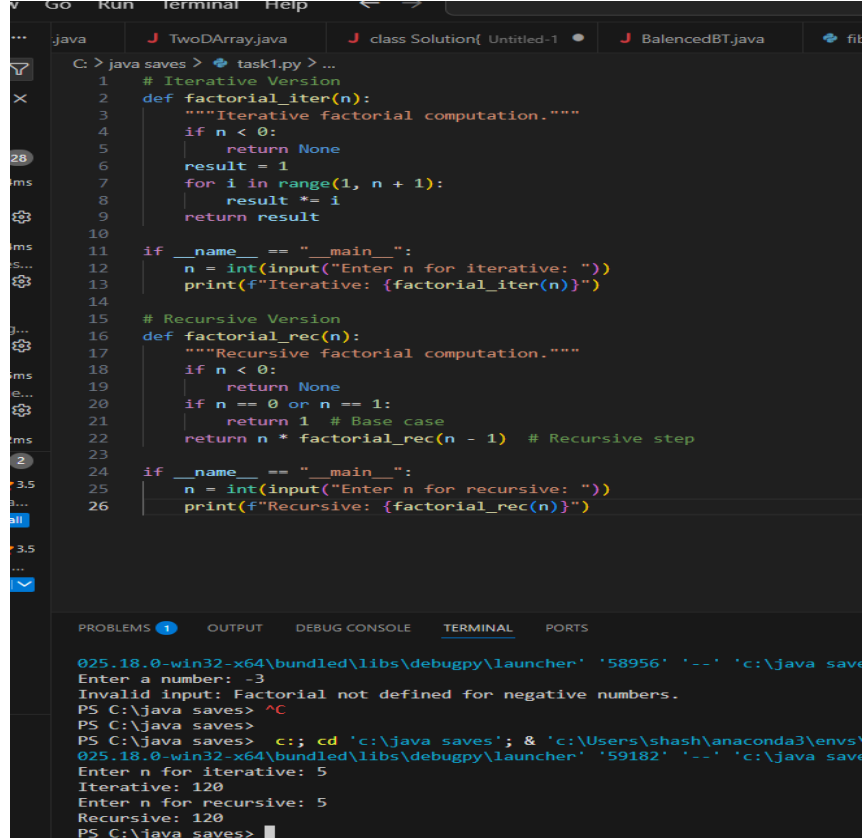
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

--- Quick Comparison Summary ---
Code Clarity: Modular > Inline (separation of concerns)
Reusability: Modular >> Inline (call function anywhere)
Debugging Ease: Modular > Inline (test function independently)
Suitability for Large-Scale: Modular >> Inline (promotes clean architecture)
PS C:\java saves> ^C
PS C:\java saves>
PS C:\java saves> c:; cd 'c:\java saves'; & 'c:\Users\shash\anaconda3\envs\Shashidhar\py
025.18.0-win32-x64\bundled\libs\debugpy\launcher' '63490' '-' 'c:\java saves\task1.py'
Enter a number: 5
Factorial of 5: 120
PS C:\java saves> |
```

	 <p>The screenshot shows a code editor with a Python file named <code>task1.py</code>. The code defines a <code>factorial(n)</code> function that uses iteration to calculate the factorial of <code>n</code>. It handles negative inputs by returning <code>None</code>. The main execution block prompts the user to enter a number and prints the factorial result or an error message for negative numbers.</p> <p>The terminal output shows the program being executed in a PowerShell prompt. The user enters <code>5</code>, and the program outputs <code>Factorial of 5: 120</code>. This process is repeated twice, with the same input and output.</p>	
	<p><b>Task 5: AI-Generated Iterative vs Recursive Thinking</b></p> <ul style="list-style-type: none"> <li>❖ <b>Scenario</b> Your mentor wants to test how well AI understands different computational paradigms.</li> <li>❖ <b>Task Description</b> Prompt Copilot to generate: An <b>iterative</b> version of the logic A <b>recursive</b> version of the same logic</li> <li>❖ <b>Constraints</b> Both implementations must produce identical outputs Students must <b>not manually write the code first</b></li> <li>❖ <b>Expected Deliverables</b> Two AI-generated implementations Execution flow explanation (in your own words) Comparison covering: <ul style="list-style-type: none"> <li>➤ Readability</li> <li>➤ Stack usage</li> <li>➤ Performance implications</li> </ul> </li> </ul>	



➤ When recursion is *not* recommended.



```
1 # Iterative Version
2 def factorial_iter(n):
3     """Iterative factorial computation."""
4     if n < 0:
5         return None
6     result = 1
7     for i in range(1, n + 1):
8         result *= i
9     return result
10
11 if __name__ == "__main__":
12     n = int(input("Enter n for iterative: "))
13     print(f"Iterative: {factorial_iter(n)}")
14
15 # Recursive Version
16 def factorial_rec(n):
17     """Recursive factorial computation."""
18     if n < 0:
19         return None
20     if n == 0 or n == 1:
21         return 1 # Base case
22     return n * factorial_rec(n - 1) # Recursive step
23
24 if __name__ == "__main__":
25     n = int(input("Enter n for recursive: "))
26     print(f"Recursive: {factorial_rec(n)}")
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
025.18.0-win32-x64\bundled\libs\debugpy\launcher' '58956' '--' 'c:\java save
Enter a number: -3
Invalid input: Factorial not defined for negative numbers.
PS C:\java saves> ^C
PS C:\java saves>
PS C:\java saves> c:; cd 'c:\java saves'; & 'c:\Users\shash\anaconda3\envs\
025.18.0-win32-x64\bundled\libs\debugpy\launcher' '59182' '--' 'c:\java save
Enter n for iterative: 5
Iterative: 120
Enter n for recursive: 5
Recursive: 120
PS C:\java saves>
```

### 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.