

AI ASSISTED CODING

LABASSIGNMENT-1

Name: Kashireddy Tejaswini

HT.NO: 2303A51425

Batch:21

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

Prompt:#generateacodetogetfactorialofanumberwithoutusingfunctions [Code](#)
and Output Screenshot:

```
Lab_2.py X
Lab_2.py > ...
1 #write a python code to calculate factorial of a number without using any fuctions.
2 num = 5
3 factorial = 1
4 for i in range(1, num + 1):
5     factorial *= i
6 print("The factorial of", num, "is:", factorial)
7
8
9
10
11
12
```

PROBLEMS OUTPUT DEBUG CONSOLE **TERMINAL** PORTS SQL HISTORY TASK MONITOR

```
(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding> & C:/Users/WINDOWS/AppData/Local/Programs/Python/Python35-32/python.exe "c:/Users/WINDOWS/OneDrive/Desktop/Teja 3_2/AI Assit coding/Lab_2.py"
The factorial of 5 is: 120
(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding>
```

Observation:

GitHub Copilot was helpful formebeinga beginner,ithelpedmewiththeright typeoflogicinloops.Itshortenedthetimetotocidersyntaxandbasiccontrol flow logic. Copilot made the things easy like initializing a variable properly and choosing good loop condition expressions. For new user it works more like an intelligent code assistant than an educator. Finally it improves confidence and quickness and must be done while also learning base skills.

Question-2: AI Code Optimization & Cleanup (Improving Efficiency)

Prompt: #generate an optimized version code of Factorial of a given Number. [Code](#)

and Output Screenshot:

The image shows a Visual Studio Code editor window with a Python file named `Lab_2.py`. The script calculates the factorial of a user-input number. The code is as follows:

```
13 #task-2:
14 #generate an optimized version code of Factorial of a given number
15 number = int(input("Enter a number to calculate its factorial: "))
16 factorial = 1
17 i = 1
18 while i <= number:
19     factorial *= i
20     i += 1
21 print("The factorial of {} is {}".format(number, factorial))
22
23
```

The terminal output shows the script being executed from a PowerShell prompt. The user enters 6, and the output is 720.

```
(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding> C:/Users/WINDOWS/AppData/Local/Programs/Python/Python35-32/python.exe "c:/Users/WINDOWS/OneDrive/Desktop/Teja 3_2/AI Assit coding/Lab_2.py"
Enter a number to calculate its factorial: 6
The factorial of 6 is 720
(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding>
```

On the right side of the editor, there is a sidebar with the text "Build with Agent" and a sub-header "AI responses may be inaccurate." Below this, it says "Generate Agent Instructions to onboard AI onto your codebase."

Observation:

Using GitHub Copilot for the optimized factorial code produced a more efficient and well-structured solution. The optimized logic reduced unnecessary computations and improved performance. Copilot suggested clear function design and concise implementation, making the code easy to read and reuse. Inline comments helped explain the optimized approach, encouraging good programming practices.

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

Prompt: #generate a code to get factorial of a number with using functions **Code and**

Output Screenshot:

The screenshot shows a VS Code editor with a Python file named `Lab_2.py`. The code defines a `factorial` function and calculates the factorial of 5. The terminal window shows the command execution and the output: `The factorial of 5 is: 120`.

```

24
25 #task-3:
26 #write a python code to calculate factorial of a number with using any fuctions
27 def factorial(n):
28     # Initialize result to 1
29     result = 1
30     # Loop from 1 to n and multiply each number to result
31     for i in range(1, n + 1):
32         result *= i
33     return result
34 num = 5
35 result = factorial(num)
36 print("The factorial of", num, "is:", result)
37
38

```

```

(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding> C:/Users/WINDOWS/AppData/Local/Programs/Python/Python35-32/python.exe "c:/Users/WINDOWS/OneDrive/Desktop/Teja 3_2/AI Assit coding/Lab_2.py"
The factorial of 5 is: 120

```

Observation:

Using GitHub Copilot for a modular design made the code more structured and easier to understand. Copilot suggested meaningful function names and clear parameters, which improves readability. The separation of logic into a function allows the same factorial computation to be reused across multiple programs. Inline comments generated by Copilot helped clarify each step of the logic for beginners. Copilot naturally encourages good programming practices through function-based design.

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

Prompt: No prompt

Code and Output Screenshot: No code Comparison

Table:

Features	Without Functions (Procedural Code)	With Functions (Modular Code)
Logic Clarity	Logic is written in a single flow, easy to follow for small programs.	Logic is divided into functions, making it clearer and more structured.
Code Structure	Simple and linear structure.	Organized and modular structure.
Reusability	Code cannot be reused easily and may require repetition.	Functions can be reused multiple times in the program.
Debugging Ease	Debugging becomes difficult as the program grows larger.	Easier to debug because errors can be traced to specific functions.
Suitability for Large Projects	Not suitable for large or complex programs.	Well suited for large-scale projects.
AI Dependency Risk	Higher risk due to long blocks of AI-generated code that are harder to understand.	Lower risk because functions encourage understanding and verification of AI-generated logic.

Technical Report:

In terms of logic clarity, procedural code written without functions is simple and straightforward for very small programs. Since all instructions are written in a single continuous sequence, beginners can easily follow the execution flow from input to output. This approach helps new programmers understand basic programming concepts without the additional complexity of functions. However, as the program becomes longer and more complex, procedural code starts to lose clarity. Large blocks

of logic reduce readability and make it difficult to understand how different parts of the program are connected. This often leads to confusion and errors during development.

Modular code using functions significantly improves logic clarity by breaking the program into smaller, meaningful units. Each function is designed to perform a specific task, making the code easier to read, understand, and manage. Well-named functions clearly describe their purpose, allowing developers to understand the overall program structure at a glance. This structured approach enhances code organization and makes collaboration easier, especially when multiple developers are working on the same project.

Debugging is another important aspect where modular code performs better than procedural code. Procedural programs are easy to debug only when they are small. As the program grows, locating errors becomes difficult because all logic is tightly coupled in one flow. A single mistake can affect multiple parts of the program, increasing debugging time. In contrast, modular programming simplifies debugging by allowing developers to test and debug individual functions independently. Errors can be quickly traced to a specific function, making troubleshooting faster and more efficient.

Regarding AI dependency risk, both procedural and modular code can be affected if developers blindly trust AI-generated suggestions. However, procedural code poses a higher risk because large blocks of AI-generated logic are harder to verify and understand. Modular code reduces this risk by encouraging developers to review, test, and understand each function separately. This promotes better human oversight and validation of AI-generated code.

Overall, function-based modular programming is more reliable, maintainable, and suitable for large-scale and professional software development.

Question-5: AI-Generated Iterative vs Recursive Thinking

Iterative:

Prompt: #generate a code to get factorial iteratively [Code](#)

and Output Screenshots:

The screenshot shows a Visual Studio Code editor with a file named `code.py`. The code implements an iterative method to calculate the factorial of a number. The terminal output shows the program running and calculating the factorial of 4, resulting in 24.

```
code.py > ...
1 # Iterative method to calculate factorial using function
2
3 def factorial_iterative(n):
4     result = 1
5     for i in range(1, n + 1):
6         result *= i
7     return result
8
9 num = int(input("Enter a number: "))
10 result = factorial_iterative(num)
11
12 print("The factorial of", num, "is:", result)
13
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SQL HISTORY TASK MONITOR

(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding> & C:/Users/WINDOWS/AppData/Local/Programs/Python/Python35-32/python.exe "c:/Users/WINDOWS/OneDrive/Desktop/Teja 3_2/AI Assit coding/code.py"

Enter a number: 4
The factorial of 4 is: 24
(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding>

Build with Agent
AI responses may be inaccurate.
Generate Agent
Instructions to onboard AI onto your codebase.

Recursive:

Prompt:#generateacodetogetfactorialrecursively Code

and Output Screenshots:

The screenshot shows a Visual Studio Code editor with a file named `code.py`. The code implements a recursive method to calculate the factorial of a number. The terminal output shows the program running and calculating the factorial of 4, resulting in 24.

```
code.py > factorial_recursive
1 # Recursive method to calculate factorial using function
2 def factorial_recursive(n):
3     if n == 0 or n == 1:
4         return 1
5     return n * factorial_recursive(n - 1)
6
7 num = int(input("Enter a number: "))
8 result = factorial_recursive(num)
9
10 print("The factorial of", num, "is:", result)
11
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SQL HISTORY TASK MONITOR

(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding> & C:/Users/WINDOWS/AppData/Local/Programs/Python/Python35-32/python.exe "c:/Users/WINDOWS/OneDrive/Desktop/Teja 3_2/AI Assit coding/code.py"

Enter a number: 4
The factorial of 4 is: 24
(base) PS C:\Users\WINDOWS\OneDrive\Desktop\Teja 3_2\AI Assit coding>

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ExecutionFlowExplanation:

In the **iterative approach**, the program starts with a value of 1 and uses a loop to multiply it with every number from 1 up to the given input. The result is updated step by step inside the same loop until the final factorial value is obtained.

In the **recursive approach**, the function solves the problem by breaking it into smaller parts. Each function call depends on the result of the next call, continuing until it reaches a base case (0 or 1). After reaching the base case, the function calls return one by one, multiplying the values together to produce the final factorial.

Comparative Analysis:

Readability:

The iterative approach is usually easier for beginners to read and understand because the flow of execution is straightforward. Recursive code, although mathematically elegant, can be hard to follow since the function keeps calling itself, which makes tracing the execution more complex.

Stack Usage:

Iterative implementations use constant memory because they rely on a single loop. In contrast, recursive implementations consume extra stack memory for every function call, which increases memory usage.

Performance Implications:

Iterative solutions are generally faster and more memory-efficient. Recursive solutions introduce overhead due to repeated function calls and stack operations, which can slow down execution.

When Recursion Is Not Recommended:

Recursion should be avoided when dealing with very large inputs because it can cause stack overflow. It is also not ideal for performance-critical or memory-limited applications, and when the problem logic does not naturally suit a recursive approach.