

AI ASSISTED CODING

LAB ASSIGNMENT-1

Name: Deekshith Kowdagani

HT.NO: 2303A51414

Batch: 21

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

Prompt: # generate a code to get factorial of a number without using functions

Code and Output Screenshot:

The screenshot shows a Python script named `Task_01.py` in a code editor. The code defines a function to calculate the factorial of a number without using functions. It prompts the user for a number, initializes a factorial variable to 1, iterates through a range from 1 to the input number, and multiplies the factorial by each iteration value. Finally, it prints the result. The terminal below shows the script being run in a Windows command prompt, entering 5 as the number, and displaying the output "The factorial of 5 is 120".

```
1 #generate a code to get factorial of a number without using functions
2 number = int(input("Enter a number to find its factorial: "))
3 factorial = 1
4 for i in range(1, number + 1):
5     factorial *= i
6 print(f"The factorial of {number} is {factorial}")
7
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.exe e:/3_2/AI_AssistantCoding/Task_01.py
Enter a number to find its factorial: 5
The factorial of 5 is 120
PS E:\3_2\AI_AssistantCoding>

Observation:

GitHub Copilot was helpful for me being a beginner, it helped me with the right type of logic in loops. It shortened the time to consider syntax and basic control 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:

```
7
8 # generate an optimized version code of Factorial of a given Number.
9 number = int(input("Enter a number to find its factorial: "))
10 factorial = 1
11 i = 1
12 while i <= number:
13     factorial *= i
14     i += 1
15 print(f"The factorial of {number} is {factorial}")

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS    Python + ▾    ...    [ ]    X
PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.exe e:/3_2/AI_AssistantCoding/Task_01.py
The factorial of 5 is 120
PS E:\3_2\AI_AssistantCoding>
○ PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.exe e:/3_2/AI_AssistantCoding/Task_01.py
● Enter a number to find its factorial: 5
The factorial of 5 is 120
Enter a number to find its factorial: 5
The factorial of 5 is 120
○ PS E:\3_2\AI_AssistantCoding>
```

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:

```
18     # generate a code to get factorial of a number with using functions
19     def factorial(n):
20         if n == 0:
21             return 1
22         else:
23             return n * factorial(n-1)
24
25 number = int(input("Enter a number to find its factorial: "))
26 print(f"The factorial of {number} is {factorial(number)}")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.e
xe e:/3_2/AI_AssistantCoding/Task_01.py

● PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.e
xe e:/3_2/AI_AssistantCoding/Task_01.py

Enter a number to find its factorial: 5

The factorial of 5 is 120

Enter a number to find its factorial: 5

The factorial of 5 is 120

Enter a number to find its factorial: 8

The factorial of 8 is 40320

○ PS E:\3_2\AI_AssistantCoding>

Ln 26, Col 59 Spaces: 4 UTF-8 CRLF { } Python 3.11.9 (Micro

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	With Functions
Code Structure	Simple and linear	Organized and Modular
Length of code	Shorter	Slightly long

Reusability	Cannot be reduced easily	Can be reused multiple times
Maintenance	Harder for large programs	Easy to debug and modify
Calling Mechanism	Runs directly	Function is called

Technical Report:

or **logic clarity**, a procedural version (without functions) feels simple and direct for very small programs because everything is written in one continuous flow. Beginners can easily follow the steps from input to output. But as the program grows, this style quickly becomes messy and harder to understand. A modular version (using functions) improves clarity by putting the main logic into well-named functions, so anyone reading the code can understand its purpose at a glance.

For **debugging**, procedural code is easy to fix when the program is small. But in longer scripts, finding errors becomes confusing and time-consuming. Modular code makes debugging much easier because problems can usually be traced back to a specific function. This allows developers to test and fix parts of the program independently.

Regarding **AI dependency risk**, both approaches have risks if someone blindly trusts Copilot's suggestions. However, modular code slightly reduces this risk .

Question-5: AI-Generated Iterative vs Recursive Thinking

Iterative:

Prompt: # generate a code to get factorial iteratively

Code and Output Screenshots:

A screenshot of the Visual Studio Code interface. The left pane shows a Python file named 'Task_01.py' with the following code:

```
28
29     # generate a code to get factorial iteratively
30     def factorial_iterative(n):
31         result = 1
32         for i in range(1, n + 1):
33             result *= i
34         return result
35
36 number = int(input("Enter a number to find its factorial: "))
37 print(f"The factorial of {number} is {factorial_iterative(number)}")
```

The right pane shows a terminal window with the following session:

```
PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.exe
xe e:/3_2/AI_AssistantCoding/Task_01.py
Enter a number to find its factorial: 4
The factorial of 4 is 24
PS E:\3_2\AI_AssistantCoding>
```

Recursive:

Prompt: # generate a code to get factorial recursively

Code and Output Screenshots:

A screenshot of the Visual Studio Code interface. The left pane shows a Python file named 'Task_01.py' with the following code:

```
38
39
40     # generate a code to get factorial recursively
41     def factorial_recursive(n):
42         if n == 0:
43             return 1
44         else:
45             return n * factorial_recursive(n-1)
46
47 number = int(input("Enter a number to find its factorial: "))
48 print(f"The factorial of {number} is {factorial_recursive(number)}")
```

The right pane shows a terminal window with the following session:

```
PS E:\3_2\AI_AssistantCoding> & C:/Users/Deekshith/AppData/Local/Microsoft/WindowsApps/python3.11.exe
xe e:/3_2/AI_AssistantCoding/Task_01.py
Enter a number to find its factorial: 4
The factorial of 4 is 24
PS E:\3_2\AI_AssistantCoding>
```

Execution Flow Explanation:

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 harder 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.