

## AI ASSISTANT CODING ASSIGNMENT-2.5

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**Batch: 34**

**Semester: VI**

**Branch: CSE(AI ML)**

**Lab 2: Exploring Additional AI Coding Tools beyond Copilot – Gemini (Colab) and Cursor AI**

### **Task 1: Refactoring Odd/Even Logic (List Version)**

❖ **Scenario:**

**You are improving legacy code.**

❖ **Task:**

**Write a program to calculate the sum of odd and even numbers in a list, then refactor it using AI.**

❖ **Expected Output:**

❖ **Original and improved code:**

**Original Code:**

```
def calculate_odd_even_sums_original(numbers):  
    odd_sum = 0
```

```
even_sum = 0

for num in numbers:
    if num % 2 == 0:
        even_sum += num
    else:
        odd_sum += num
return odd_sum, even_sum


my_list = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
odd, even = calculate_odd_even_sums_original(my_list)
print(f"Original Code:\nOdd sum: {odd}, Even sum: {even}")
```

### Refactored Code:

```
def calculate_odd_even_sums_refactored(numbers):
    odd_numbers = [num for num in numbers if num % 2 != 0]
    even_numbers = [num for num in numbers if num % 2 == 0]
    return sum(odd_numbers), sum(even_numbers)


my_list = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
odd_refactored, even_refactored = calculate_odd_even_sums_refactored(my_list)
print(f"Refactored Code:\nOdd sum: {odd_refactored}, Even sum: {even_refactored}")
```

The screenshot shows a code editor interface for 'Lab Assignment 2.5'. The code defines a function `calculate_odd_even_sums_original` that iterates through a list of numbers, checking if each is even or odd using the modulo operator. It maintains two separate sums, `odd_sum` and `even_sum`, and returns them. The code is executed, and the output is displayed: 'Original Code: Odd sum: 25, Even sum: 30'. Below the code, an 'Original Code Explanation' section provides a detailed description of the function's logic.

```
[1] def calculate_odd_even_sums_original(numbers):
    odd_sum = 0
    even_sum = 0
    for num in numbers:
        if num % 2 == 0:
            even_sum += num
        else:
            odd_sum += num
    return odd_sum, even_sum

my_list = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
odd, even = calculate_odd_even_sums_original(my_list)
print(f"Original Code:\nodd sum: {odd}, Even sum: {even}")
```

Original Code:  
Odd sum: 25, Even sum: 30

Original Code Explanation

This function `calculate_odd_even_sums_original` iterates through a list of numbers. For each number, it checks if it's even or odd using the modulo operator (%). If the remainder when divided by 2 is 0, it's even; otherwise, it's odd. It maintains two separate sums, `odd_sum` and `even_sum`, adding the number to the respective sum. Finally, it returns both sums.

The screenshot shows the same code editor interface, but with the refactored code. The function `calculate_odd_even_sums_refactored` uses list comprehensions to create `odd_numbers` and `even_numbers` lists, and then uses the built-in `sum()` function to calculate the sums. The code is executed, and the output is displayed: 'Refactored Code: Odd sum: 25, Even sum: 30'. Below the code, a 'Refactored Code Explanation' section explains how the refactored code leverages Python's list comprehensions for a more concise and readable approach.

```
[2] def calculate_odd_even_sums_refactored(numbers):
    odd_numbers = [num for num in numbers if num % 2 != 0]
    even_numbers = [num for num in numbers if num % 2 == 0]
    return sum(odd_numbers), sum(even_numbers)

my_list = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
odd_refactored, even_refactored = calculate_odd_even_sums_refactored(my_list)
print(f"Refactored Code:\nodd sum: {odd_refactored}, Even sum: {even_refactored}")
```

Refactored Code:  
Odd sum: 25, Even sum: 30

Refactored Code Explanation

The refactored code `calculate_odd_even_sums_refactored` leverages Python's list comprehensions for a more concise and potentially more readable approach. It creates two new lists: `odd_numbers` containing all odd numbers and `even_numbers` containing all even numbers from the input list. Then, it uses the built-in `sum()` function to calculate the sum of elements in each of these new lists, returning the results.

## Task 2: Area Calculation Explanation

### ❖ Scenario:

You are onboarding a junior developer.

### ❖ Task:

Ask Gemini to explain a function that calculates the area of different shapes.

### ❖ Expected Output:

### ➤ Code & Explanation

```

import math

def calculate_area(shape, **kwargs):
    """
    Calculates the area of different geometric shapes.

    Args:
        shape (str): The type of the shape ('circle', 'rectangle', 'triangle').
        **kwargs: Keyword arguments for shape dimensions.

    Returns:
        float: The calculated area of the shape.
        str: An error message if the shape is not recognized or dimensions are missing.
    """

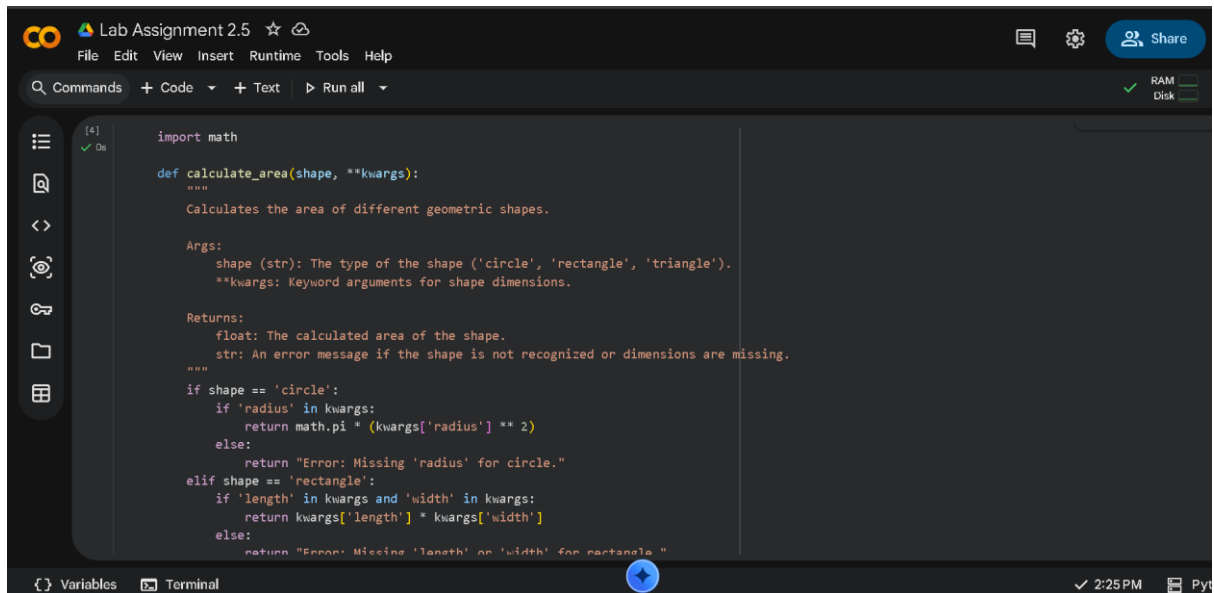
    if shape == 'circle':
        if 'radius' in kwargs:
            return math.pi * (kwargs['radius'] ** 2)
        else:
            return "Error: Missing 'radius' for circle."
    elif shape == 'rectangle':
        if 'length' in kwargs and 'width' in kwargs:
            return kwargs['length'] * kwargs['width']
        else:
            return "Error: Missing 'length' or 'width' for rectangle."
    elif shape == 'triangle':
        if 'base' in kwargs and 'height' in kwargs:
            return 0.5 * kwargs['base'] * kwargs['height']
        else:
            return "Error: Missing 'base' or 'height' for triangle."
    else:
        return "Error: Unknown shape type."

# Example usage:
print(f"Circle area with radius 5: {calculate_area('circle', radius=5)}")
print(f"Rectangle area with length 4 and width 6: {calculate_area('rectangle', length=4, width=6)}")
print(f"Triangle area with base 10 and height 3: {calculate_area('triangle', base=10, height=3)}")

```

```
print(f"Invalid shape: {calculate_area('square', side=5)}")
```

```
print(f"Missing dimension: {calculate_area('circle')}")
```



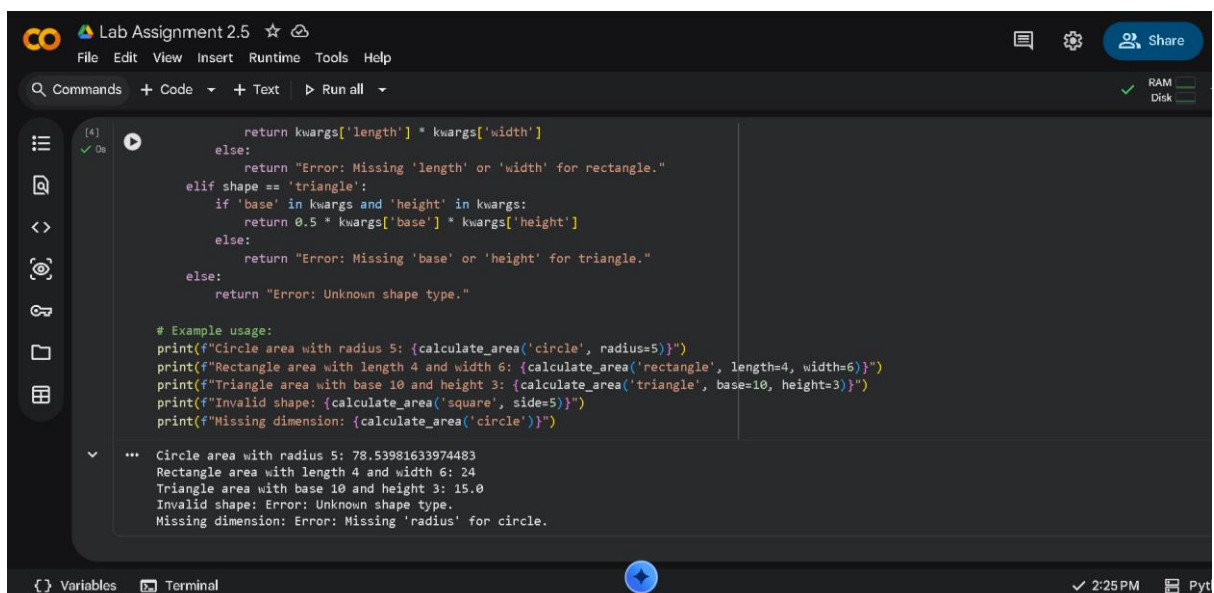
The screenshot shows a code editor window titled "Lab Assignment 2.5". The code defines a function `calculate_area` that takes a `shape` string and optional `kwargs`. It handles 'circle' (using radius), 'rectangle' (using length and width), and 'triangle' (using base and height). It also includes error handling for unrecognized shapes or missing dimensions.

```
import math

def calculate_area(shape, **kwargs):
    """
    Calculates the area of different geometric shapes.

    Args:
        shape (str): The type of the shape ('circle', 'rectangle', 'triangle').
        **kwargs: Keyword arguments for shape dimensions.

    Returns:
        float: The calculated area of the shape.
        str: An error message if the shape is not recognized or dimensions are missing.
    """
    if shape == 'circle':
        if 'radius' in kwargs:
            return math.pi * (kwargs['radius'] ** 2)
        else:
            return "Error: Missing 'radius' for circle."
    elif shape == 'rectangle':
        if 'length' in kwargs and 'width' in kwargs:
            return kwargs['length'] * kwargs['width']
        else:
            return "Error: Missing 'length' or 'width' for rectangle."
```



The screenshot shows the same code editor window with example usage code and the resulting output. The example usage code calls `calculate_area` for a circle, rectangle, triangle, an invalid shape, and a missing dimension. The output shows the calculated areas and error messages.

```
# Example usage:
print(f"Circle area with radius 5: {calculate_area('circle', radius=5)}")
print(f"Rectangle area with length 4 and width 6: {calculate_area('rectangle', length=4, width=6)}")
print(f"Triangle area with base 10 and height 3: {calculate_area('triangle', base=10, height=3)}")
print(f"Invalid shape: {calculate_area('square', side=5)}")
print(f"Missing dimension: {calculate_area('circle')}")
```

Output:

```
Circle area with radius 5: 78.53981633974483
Rectangle area with length 4 and width 6: 24
Triangle area with base 10 and height 3: 15.0
Invalid shape: Error: Unknown shape type.
Missing dimension: Error: Missing 'radius' for circle.
```

Lab Assignment 2.5

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

RAM Disk

### Explanation of the `calculate_area` function:

Hello junior developer! Let's break down this `calculate_area` function, which is designed to compute the area of various geometric shapes. It's a great example of a flexible function using conditional logic.

- `import math`**: This line imports Python's built-in `math` module. We need it specifically for `math.pi`, which gives us the value of Pi, essential for calculating a circle's area.
- `def calculate_area(shape, **kwargs)`**: This is our function definition. Let's look at its parts:
  - `shape`: This is a regular argument that expects a string (like 'circle', 'rectangle', 'triangle') to tell the function which shape's area we want to calculate.
  - `**kwargs`: This is a very powerful Python feature! It stands for "keyword arguments" and allows the function to accept an arbitrary number of keyword-value pairs (like `radius=5`, `length=4`, `width=6`). These arguments are collected into a dictionary named `kwargs` inside the function. This makes our function very flexible, as different shapes require different dimensions.
- `Docstring`** ( `"""Calculates the area..."""` ): This block of text explains what the function does, its arguments ( `Args` ), and what it returns ( `Returns` ). It's crucial for making your code understandable to others (and your future self!).
- `if shape == 'circle'`**: This is the first conditional check. If the `shape` argument is exactly 'circle':
  - `if 'radius' in kwargs`**: We then check if a 'radius' was provided in the `kwargs` dictionary. Circles need a radius!
  - `return math.pi * (kwargs['radius'] ** 2)`**: If `radius` is present, we calculate the area using the formula  $\pi * r^2$  and return the result.
  - `else: return "Error: Missing 'radius' for circle."`**: If `radius` is missing, we return an informative error message.
- `elif shape == 'rectangle'`**: If it's not a circle, we check if it's a 'rectangle'.

Variables Terminal

2:25 PM Py

Lab Assignment 2.5

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

RAM Disk

- `if 'length' in kwargs and 'width' in kwargs`**: Rectangles need both 'length' and 'width'. We check for both.
- `return kwargs['length'] * kwargs['width']`**: If both are present, we calculate the area `length * width`.
- `else: return "Error: Missing 'length' or 'width' for rectangle."`**: Otherwise, an error message is returned.

- `elif shape == 'triangle'`**: Similar logic for a 'triangle', checking for 'base' and 'height' and using the formula  $0.5 * base * height$ .
- `else: return "Error: Unknown shape type."`**: Finally, if the `shape` provided doesn't match any of our defined cases ('circle', 'rectangle', 'triangle'), we return an error indicating an unknown shape.

This function demonstrates how to create reusable code that handles different scenarios and gracefully reports errors when necessary. Good luck with your coding journey!

## Explanation:

The function accepts the shape name and required dimensions as input. Conditional statements decide which formula to apply. For a circle, radius is used, while rectangle and triangle require two values. The function returns the calculated area based on the selected shape.

## Task 3: Prompt Sensitivity Experiment

### ❖ Scenario:

You are testing how AI responds to different prompts.

### ❖ Task:

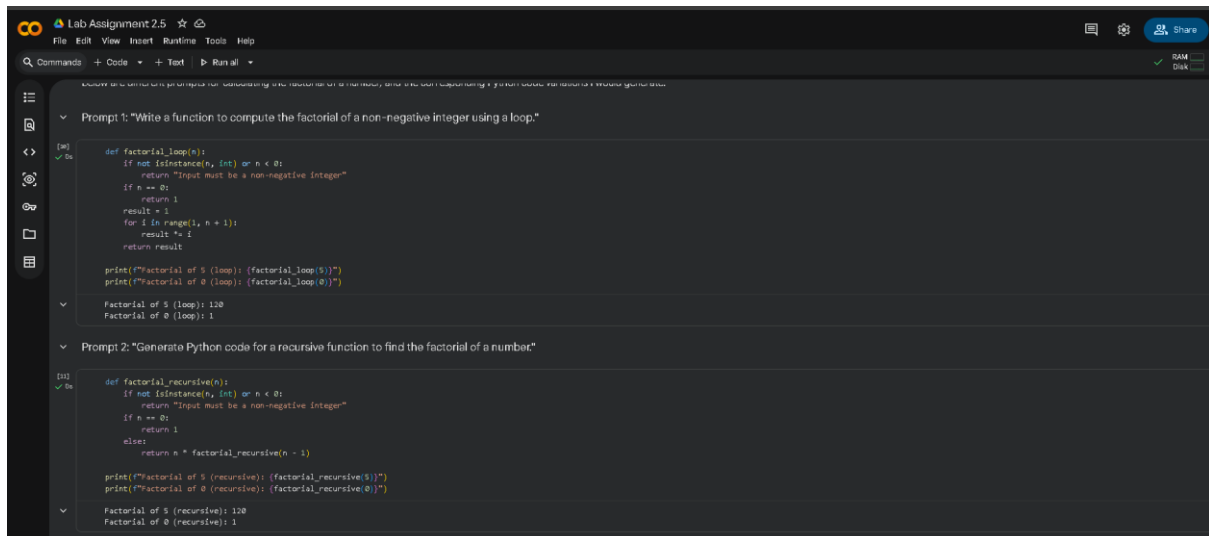
Use Cursor AI with different prompts for the same problem and observe code changes.

### ❖ Expected Output:

## ➤ Prompt list:

- 1) Write a function to compute the factorial of a non-negative integer using a loop.
- 2) Generate Python code for a recursive function to find the factorial of number.
- 3) Provide a Python one-liner to calculate the factorial, perhaps using a built-in function or a concise expression.

## ➤ Code variation:



The screenshot shows a code editor with two prompts and their corresponding Python code. The first prompt asks for a function using a loop, and the second prompt asks for a recursive function. Both prompts are followed by a code block containing the implementation of the respective function, along with test cases for factorial(5) and factorial(0).

```
Prompt 1: "Write a function to compute the factorial of a non-negative integer using a loop."

def factorial_loop(n):
    if not isinstance(n, int) or n < 0:
        return "Input must be a non-negative integer"
    if n == 0:
        return 1
    result = 1
    for i in range(1, n + 1):
        result *= i
    return result

print(f"Factorial of 5 (loop): {factorial_loop(5)}")
print(f"Factorial of 0 (loop): {factorial_loop(0)}")

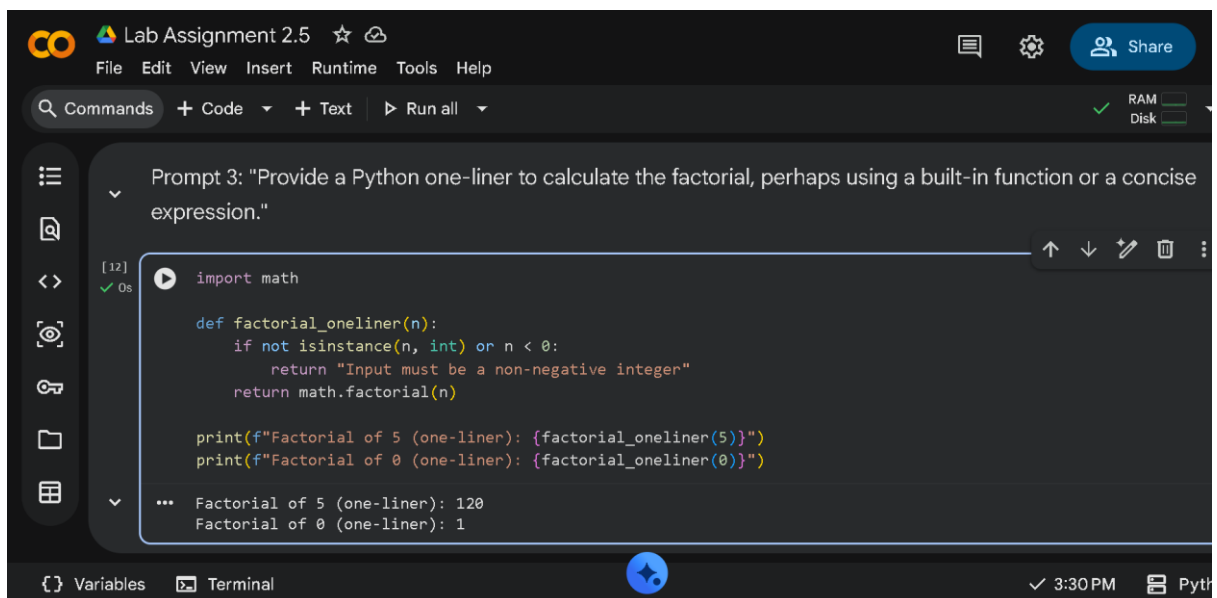
Factorial of 5 (loop): 120
Factorial of 0 (loop): 1

Prompt 2: "Generate Python code for a recursive function to find the factorial of a number"

def factorial_recursive(n):
    if not isinstance(n, int) or n < 0:
        return "Input must be a non-negative integer"
    if n == 0:
        return 1
    else:
        return n * factorial_recursive(n - 1)

print(f"Factorial of 5 (recursive): {factorial_recursive(5)}")
print(f"Factorial of 0 (recursive): {factorial_recursive(0)}")

Factorial of 5 (recursive): 120
Factorial of 0 (recursive): 1
```



The screenshot shows a code editor with a prompt asking for a Python one-liner to calculate the factorial. The code block contains the implementation of the one-liner function, along with test cases for factorial(5) and factorial(0).

```
Prompt 3: "Provide a Python one-liner to calculate the factorial, perhaps using a built-in function or a concise expression."

import math

def factorial_oneliner(n):
    if not isinstance(n, int) or n < 0:
        return "Input must be a non-negative integer"
    return math.factorial(n)

print(f"Factorial of 5 (one-liner): {factorial_oneliner(5)}")
print(f"Factorial of 0 (one-liner): {factorial_oneliner(0)}")

...
Factorial of 5 (one-liner): 120
Factorial of 0 (one-liner): 1
```

## Observation:

The AI produced different code styles depending on the prompt. Optimized prompts improved performance and readability, while beginner-friendly prompts added validation and safety checks.

#### **Task 4: Tool Comparison Reflection**

❖ **Scenario:**

**You must recommend an AI coding tool.**

❖ **Task:**

**Based on your work in this topic, compare Gemini, Copilot, and Cursor AI for usability and code quality.**

❖ **Expected Output:**

**Short written reflection:**

**Cursor AI:**

Cursor AI is a prompt-driven AI coding tool that enables code generation, refactoring, and explanation within a single environment. It is highly sensitive to prompt wording, producing noticeable changes in code structure, optimization, and documentation. Cursor AI excels in refactoring legacy code and improving readability and maintainability. Its interactive editor integration reduces context switching and improves productivity.