LAB-02

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Exploring Additional AI Coding Tools beyond Copilot – Gemini (Colab) and Cursor AI

Task 1: Statistical Summary for Survey Data

❖ **Scenario:**

You are a data analyst intern working with survey responses stored as numerical lists.

❖ **Task:**

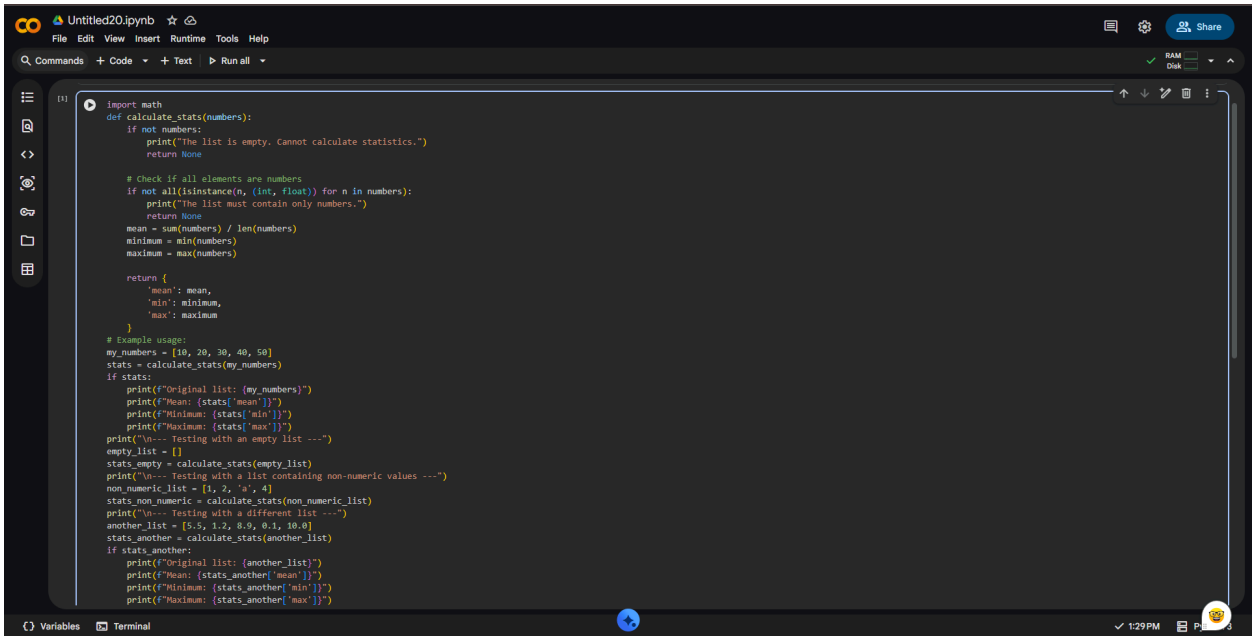
Use Google Gemini in Colab to generate a Python function that reads a list of numbers and calculates the mean, minimum, and maximum values.

❖ **Expected Output:**

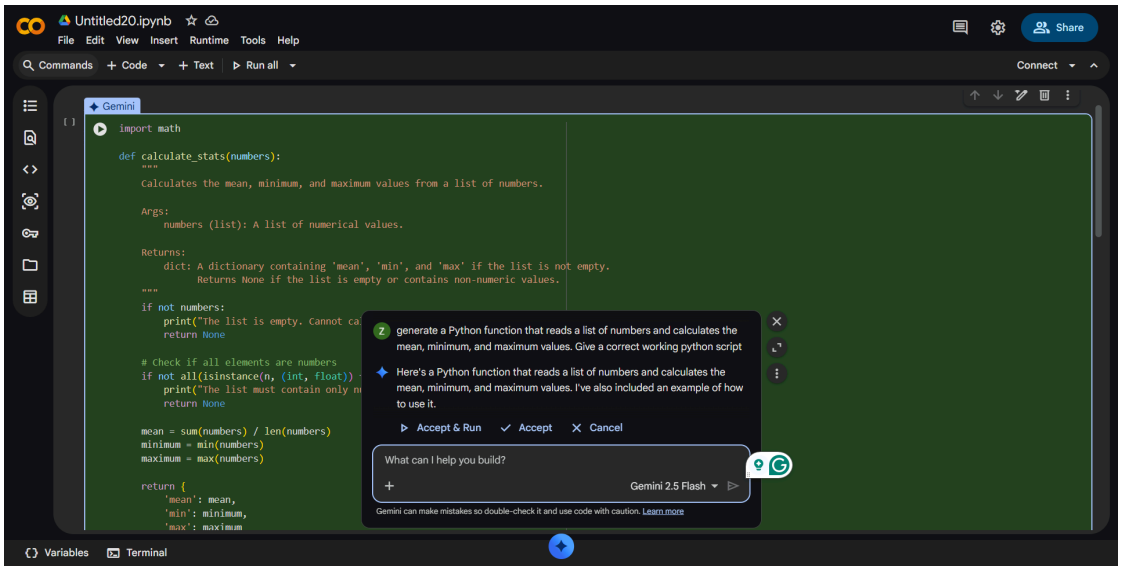
➢ **Correct Python function**

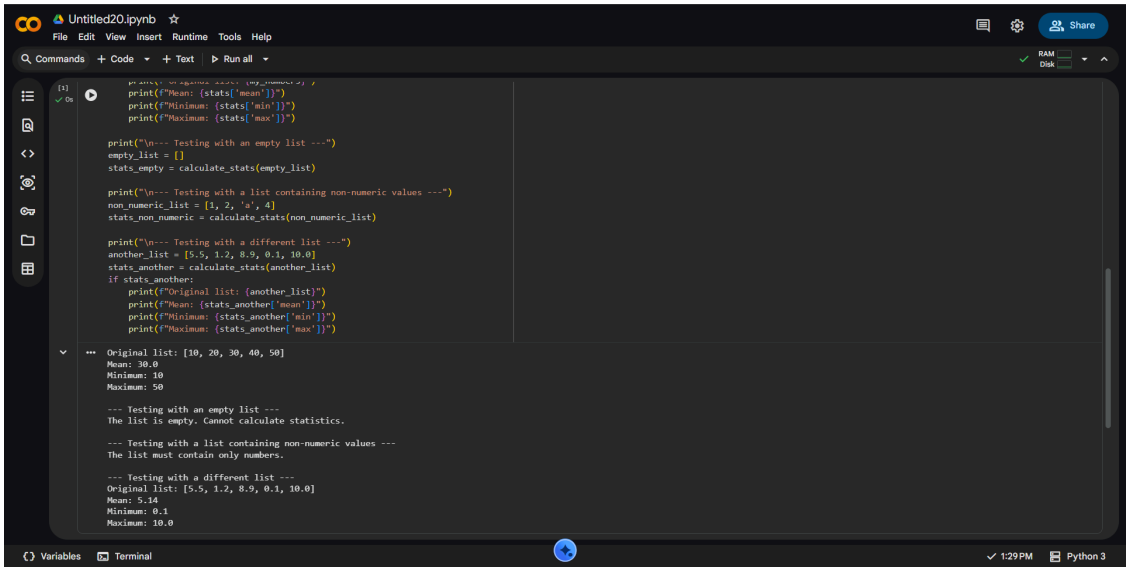
Prompt:

"Generate a Python function that reads a list
of numbers and calculates the mean, minimum, and maximum values."

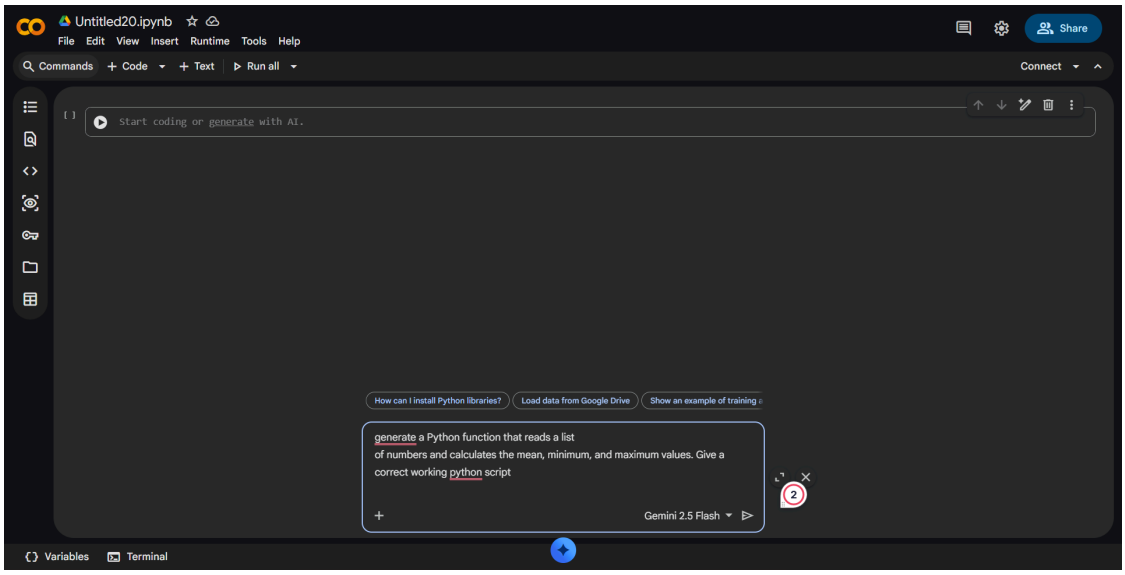


➢ Output shown in Colab





➢ Screenshot of Gemini prompt and result



Justification:

- The code uses proper input validation to handle empty lists and non-numeric values, preventing runtime errors.
- It provides clear, user-friendly messages instead of failing silently, improving usability.
- The statistical calculations (mean, minimum, maximum) are logically correct, as shown by the test outputs.
- Encapsulating the logic in a function makes the code reusable and easy to test across different datasets.

Task 2: Armstrong Number – AI Comparison

❖ Scenario:

You are evaluating AI tools for numeric validation logic.

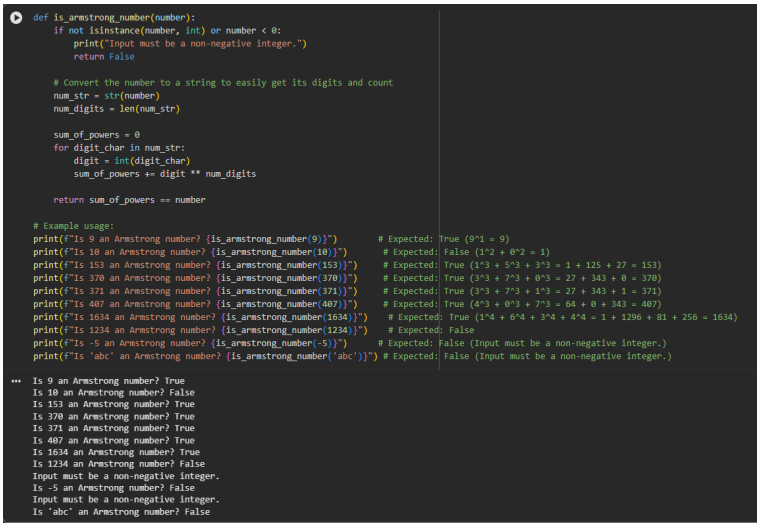
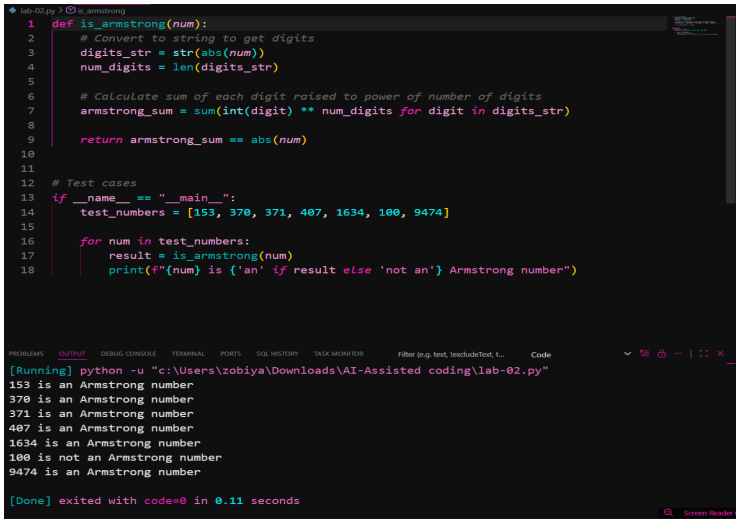
❖ Task:

Generate an Armstrong number checker using Gemini and GitHub Copilot.

Compare their outputs, logic style, and clarity.

❖ Expected Output:

➢ Side-by-side comparison table

Gemini	GitHub Copilot
	
Prompt: “Generate an Armstrong number checker.”	Prompt: “Generate an Armstrong number checker.”
Output: Produces correct results for valid inputs and provides clear feedback when invalid inputs are given.	**Output:** Produces correct Armstrong results for valid integers but silently handles negative values by converting them to positive, which may be conceptually misleading.
Logic style: Follows a step-by-step procedural approach, making each stage of the calculation explicit. **Clarity:** Uses descriptive variable names and comments, improving readability and understanding.	**Logic style:** Uses a compact, Pythonic approach with a generator expression and `sum()`, prioritizing brevity and efficiency. **Clarity:** The core logic is condensed into a single line, making it less transparent for beginners.
Error handling: Explicitly checks for non-integer and negative inputs, ensuring logical correctness.	**Error handling:** Assumes valid input and does not explicitly handle incorrect data types or invalid values.
Use case strength: Better suited as a foundational or educational implementation due to its robustness and clarity.	Use case strength: Well-suited for clean demonstrations or experienced programmers who value concise code.

➢ Screenshots of prompts and generated code

Gemini Code:

```python
def is_armstrong_number(number):
    if not isinstance(number, int) or number < 0:
        print("Input must be a non-negative integer.")
        return False

    # Convert the number to a string to easily get its digits and count
    num_str = str(number)
    num_digits = len(num_str)

    sum_of_powers = 0
    for digit_char in num_str:
        digit = int(digit_char)
        sum_of_powers += digit ** num_digits

    return sum_of_powers == number

# Example usage:
print(f"Is 9 an Armstrong number? {is_armstrong_number(9)}")       # Expected: True (9^1 = 9)
print(f"Is 10 an Armstrong number? {is_armstrong_number(10)}")     # Expected: False (1^2 + 0^2 = 1)
print(f"Is 153 an Armstrong number? {is_armstrong_number(153)}")   # Expected: True (1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153)
print(f"Is 370 an Armstrong number? {is_armstrong_number(370)}")   # Expected: True (3^3 + 7^3 + 0^3 = 27 + 343 + 0 = 370)
print(f"Is 371 an Armstrong number? {is_armstrong_number(371)}")   # Expected: True (3^3 + 7^3 + 1^3 = 27 + 343 + 1 = 371)
print(f"Is 407 an Armstrong number? {is_armstrong_number(407)}")   # Expected: True (4^3 + 0^3 + 7^3 = 64 + 0 + 343 = 407)
print(f"Is 1634 an Armstrong number? {is_armstrong_number(1634)}") # Expected: True (1^4 + 6^4 + 3^4 + 4^4 = 1 + 1296 + 81 + 256 = 1634)
print(f"Is 1234 an Armstrong number? {is_armstrong_number(1234)}") # Expected: False
print(f"Is -5 an Armstrong number? {is_armstrong_number(-5)}")     # Expected: False (Input must be a non-negative integer.)
print(f"Is 'abc' an Armstrong number? {is_armstrong_number('abc')}") # Expected: False (Input must be a non-negative integer.)
```

```
Is 9 an Armstrong number? True
Is 10 an Armstrong number? False
Is 153 an Armstrong number? True
Is 370 an Armstrong number? True
Is 371 an Armstrong number? True
Is 407 an Armstrong number? True
Is 1634 an Armstrong number? True
Is 1234 an Armstrong number? False
Input must be a non-negative integer.
Is -5 an Armstrong number? False
Input must be a non-negative integer.
Is 'abc' an Armstrong number? False
```

GitHub Copilot Code:

lab-02.py > is_armstrong

```python
def is_armstrong(num):
    # Convert to string to get digits
    digits_str = str(abs(num))
    num_digits = len(digits_str)

    # Calculate sum of each digit raised to power of number of digits
    armstrong_sum = sum(int(digit) ** num_digits for digit in digits_str)

    return armstrong_sum == abs(num)


# Test cases
if __name__ == "__main__":
    test_numbers = [153, 370, 371, 407, 1634, 100, 9474]

    for num in test_numbers:
        result = is_armstrong(num)
        print(f"{num} is {'an' if result else 'not an'} Armstrong number")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SQL HISTORY TASK MONITOR Filter (e.g. text, !excludeText, t... Code

```
[Running] python -u "c:\Users\zobiya\Downloads\AI-Assisted coding\lab-02.py"
153 is an Armstrong number
370 is an Armstrong number
371 is an Armstrong number
407 is an Armstrong number
1634 is an Armstrong number
100 is not an Armstrong number
9474 is an Armstrong number

[Done] exited with code=0 in 0.11 seconds
```

Screen Reader

Justification:

- Focusing on outputs, logic style, and clarity highlights practical aspects that matter in real programming use.
- It shows how Copilot prioritizes conciseness, while Gemini emphasizes correctness and user guidance.
- This structured evaluation makes it easy to identify which code is better suited for learning versus rapid development.
- The comparison separates the codes to fairly assess each AI's design choices without bias or overlap.

Task 3: Leap Year Validation Using Cursor AI

❖ Scenario:

You are validating a calendar module for a backend system.

❖ Task:

Use Cursor AI to generate a Python program that checks whether a given year is a leap year.

Use at least two different prompts and observe changes in code.

❖ Expected Output:

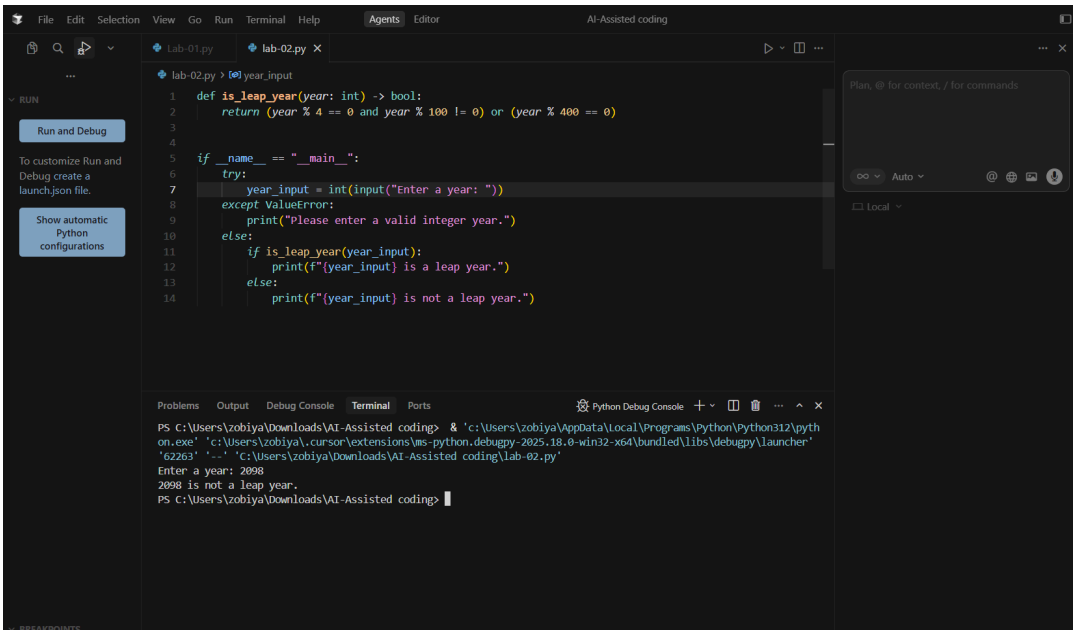
Prompt:

"generate a Python program that checks whether a given year is a leap year."

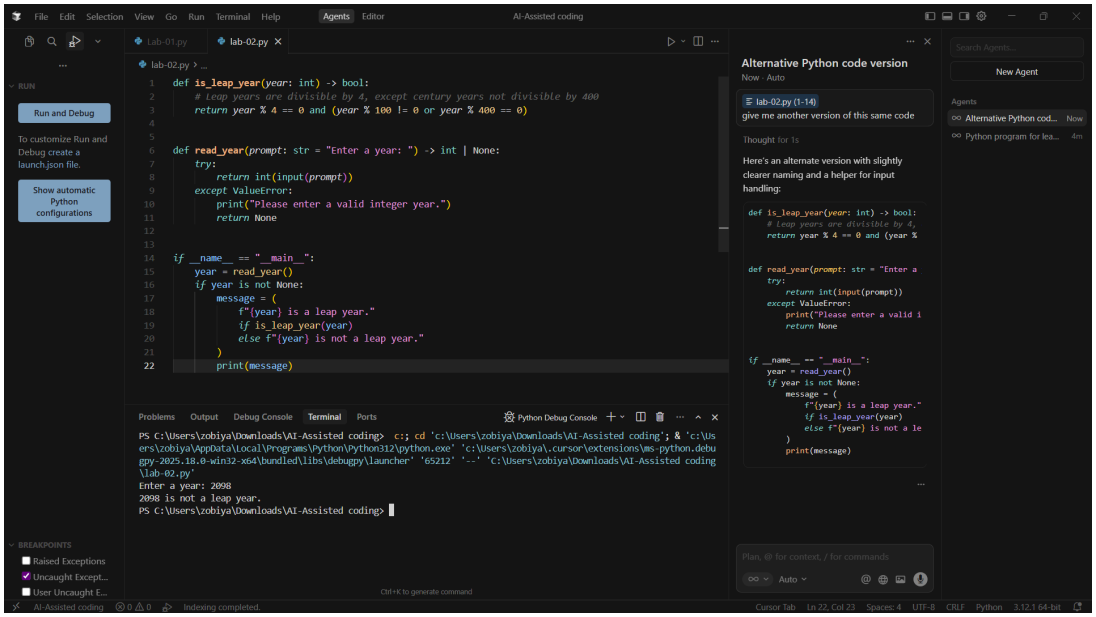
➢ Sample inputs/outputs

➢ Two versions of code

- Version 1:



- **Version 2:**



➢ Brief comparison

Version 2	Version 1
Uses separate functions for leap-year logic and input handling, improving modularity and reuse.	Keeps all logic in a single block, making it short and easy to understand.
Handles invalid input gracefully by returning `None`, keeping the main logic clean.	Uses a direct `try-except` for input validation, suitable for quick scripts.
More readable and maintainable for larger or extended programs.	Less modular but faster to write and test.

Justification:

- The first code is justified by its modular design, which improves readability and reuse.
- The second code is justified by its simplicity, making it quick to write and easy to understand.
- Together, they demonstrate how the same logic can be implemented using scalable versus minimal approaches.

Task 4: Student Logic + AI Refactoring (Odd/Even Sum)

❖ Scenario:

Company policy requires developers to write logic before using AI.

❖ Task:

Write a Python program that calculates the sum of odd and even numbers in a tuple, then refactor it using any AI tool.

❖ Expected Output:

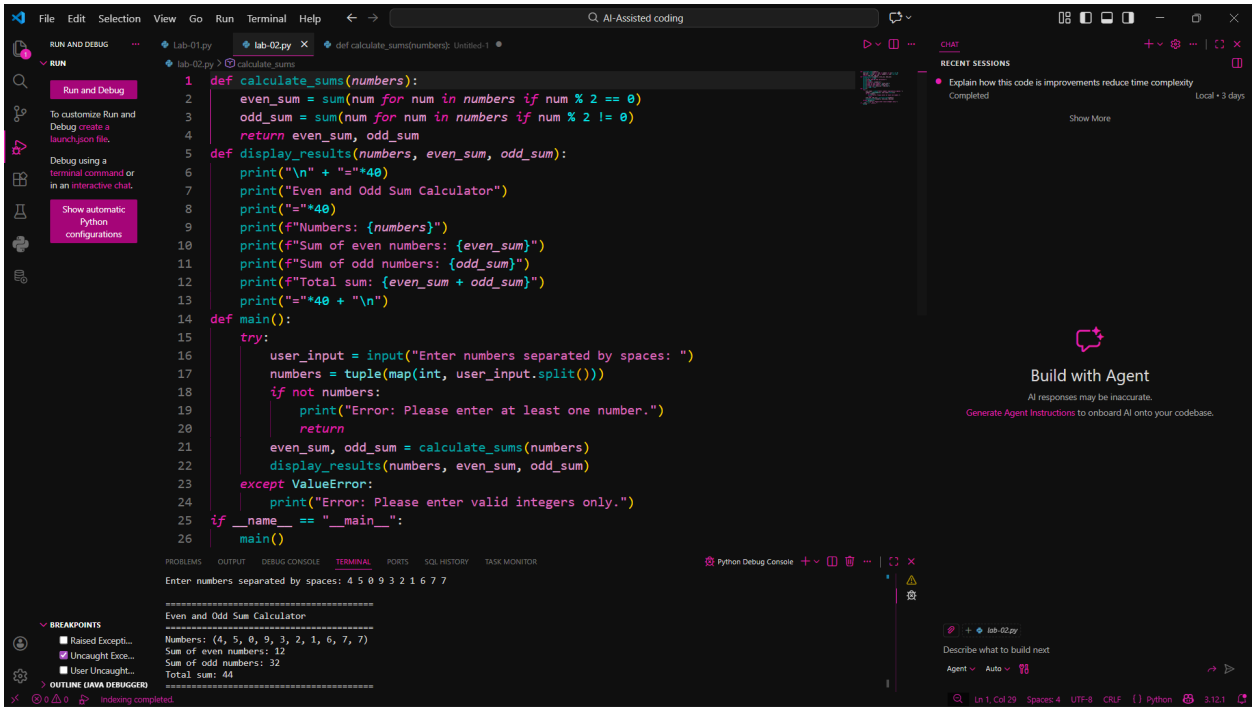
➢ Original code

```
numbers = (1, 2, 3, 4, 5, 6, 7, 8, 9)
even_sum = 0
odd_sum = 0
for num in numbers:
    if num % 2 == 0:
        even_sum = even_sum + num
    else:
        odd_sum = odd_sum + num
print("Tuple:", numbers)
print("Sum of even numbers:", even_sum)
print("Sum of odd numbers:", odd_sum)
```

```
Tuple: (1, 2, 3, 4, 5, 6, 7, 8, 9)
Sum of even numbers: 20
Sum of odd numbers: 25
```

➢ Refactored code

Prompt: "Refactor the original code with a better script and user input"



➢ **Explanation of improvements**

1. **User input instead of hardcoded data**
   The beginner code uses a fixed tuple, while the improved code allows users to enter numbers dynamically, making it more flexible and practical.

2. **Better structure using functions**
   The improved code separates logic into functions (`calculate_sums`, `display_results`, `main`), whereas the beginner code puts everything in one block. This improves readability and reuse.

3. **Efficient calculation**
   The improved version uses Python's `sum()` with conditions to compute even and odd sums concisely, while the beginner version uses a loop and manual accumulation.

4. **Error handling and validation**
   The improved code handles invalid input (non-integers or empty input) using `try–except`, which the beginner code does not address.

5. **Cleaner and more user-friendly output**
   The improved code formats the output neatly with headings and totals, making results clearer compared to basic print statements.

Justification:

The improved code is more flexible because it accepts user input instead of using fixed values.
It is better structured by using functions, which makes the program easier to read and reuse.
Error handling and cleaner output make it more reliable and user-friendly than the beginner version.