# ASSIGNMENT 2.1

**HALL NO:2303A51835**

**BATCH:27**

## Task 1: Statistical Summary for Survey Data

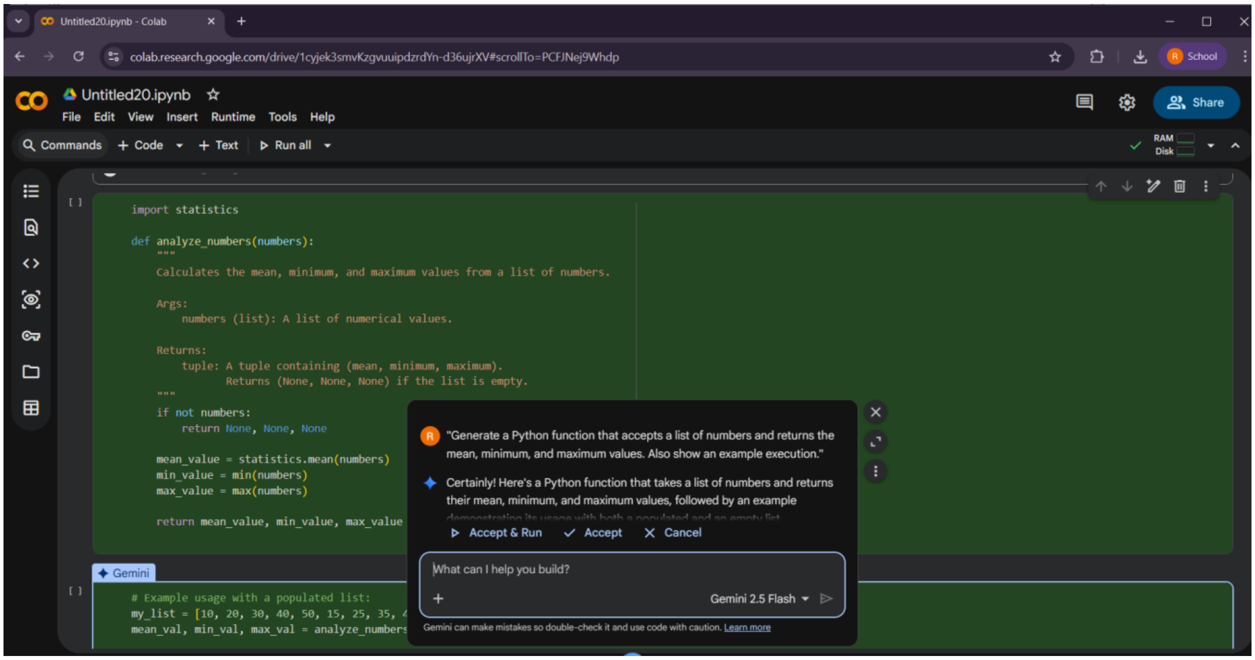
### Task

Generate a Python function that takes a list of numerical survey responses and calculates the mean, minimum, and maximum values.

### Prompt (Used in Google Gemini – Colab)

"Generate a Python function that accepts a list of numbers and returns the mean, minimum, and maximum values. Also show an example execution."

### Code: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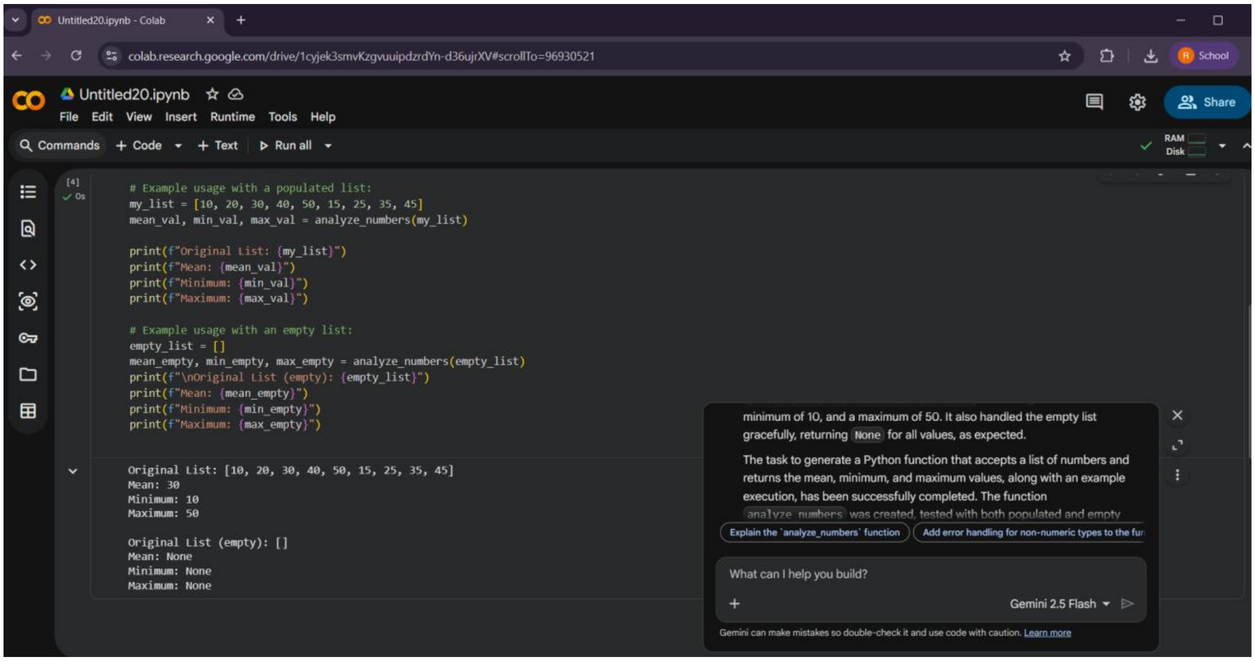
```python
import statistics

def analyze_numbers(numbers):
    """
    Calculates the mean, minimum, and maximum values from a list of numbers.

    Args:
        numbers (list): A list of numerical values.

    Returns:
        tuple: A tuple containing (mean, minimum, maximum).
               Returns (None, None, None) if the list is empty.
    """
    if not numbers:
        return None, None, None

    mean_value = statistics.mean(numbers)
    min_value = min(numbers)
    max_value = max(numbers)

    return mean_value, min_value, max_value
```

```python
# Example usage with a populated list:
my_list = [10, 20, 30, 40, 50, 15, 25, 35, 4
mean_val, min_val, max_val = analyze_numbers
```

"Generate a Python function that accepts a list of numbers and returns the mean, minimum, and maximum values. Also show an example execution."

Certainly! Here's a Python function that takes a list of numbers and returns their mean, minimum, and maximum values, followed by an example demonstrating its usage with both a populated and an empty list.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```
# Example usage with a populated list:
my_list = [10, 20, 30, 40, 50, 15, 25, 35, 45]
mean_val, min_val, max_val = analyze_numbers(my_list)

print(f"Original List: {my_list}")
print(f"Mean: {mean_val}")
print(f"Minimum: {min_val}")
print(f"Maximum: {max_val}")

# Example usage with an empty list:
empty_list = []
mean_empty, min_empty, max_empty = analyze_numbers(empty_list)
print(f"\nOriginal List (empty): {empty_list}")
print(f"Mean: {mean_empty}")
print(f"Minimum: {min_empty}")
print(f"Maximum: {max_empty}")
```

```
Original List: [10, 20, 30, 40, 50, 15, 25, 35, 45]
Mean: 30
Minimum: 10
Maximum: 50

Original List (empty): []
Mean: None
Minimum: None
Maximum: None
```

minimum of 10, and a maximum of 50. It also handled the empty list gracefully, returning `None` for all values, as expected.

The task to generate a Python function that accepts a list of numbers and returns the mean, minimum, and maximum values, along with an example execution, has been successfully completed. The function `analyze_numbers` was created, tested with both populated and empty

Explain the `analyze_numbers` function
Add error handling for non-numeric types to the fu
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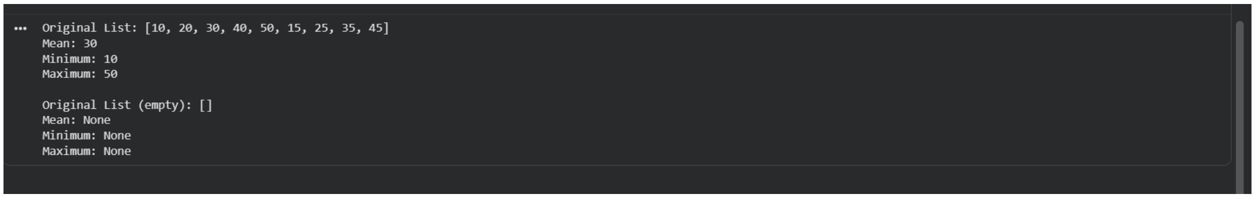
## Output:



```
Original List: [10, 20, 30, 40, 50, 15, 25, 35, 45]
Mean: 30
Minimum: 10
Maximum: 50

Original List (empty): []
Mean: None
Minimum: None
Maximum: None
```

## Justification

This function efficiently computes statistical measures using Python built-in functions. It improves readability, reduces code length, and ensures accurate results, making it suitable for real-world survey data analysis

## Task 2: Armstrong Number – AI Comparison

### Task:

Generate an Armstrong number checker using Google Gemini and GitHub Copilot, and compare their outputs and clarity.

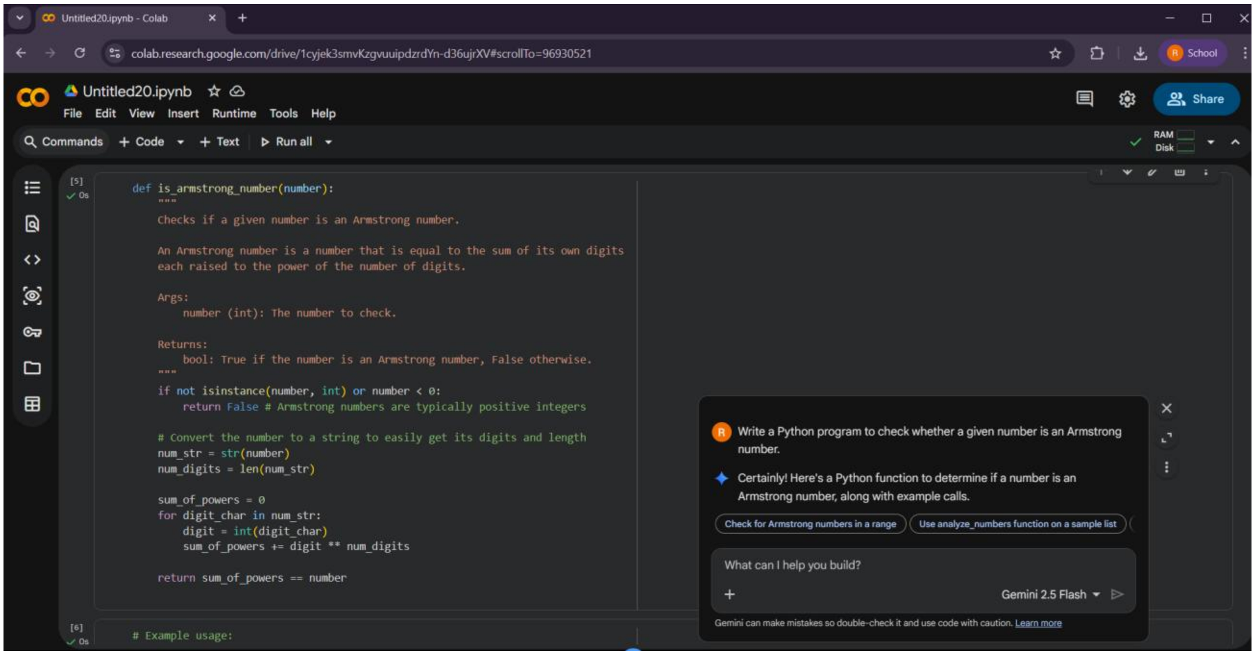
### Prompt (Gemini):

"Write a Python program to check whether a given number is an Armstrong number."

### Prompt (GitHub Copilot)

"Create a Python function that validates whether a number is an Armstrong number with clear logic and comments."

## Code (Gemini Output):



```
def is_armstrong_number(number):
    """
    Checks if a given number is an Armstrong number.

    An Armstrong number is a number that is equal to the sum of its own digits
    each raised to the power of the number of digits.

    Args:
        number (int): The number to check.

    Returns:
        bool: True if the number is an Armstrong number, False otherwise.
    """
    if not isinstance(number, int) or number < 0:
        return False # Armstrong numbers are typically positive integers

    # Convert the number to a string to easily get its digits and length
    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:
```

Write a Python program to check whether a given number is an Armstrong number.

Certainly! Here's a Python function to determine if a number is an Armstrong number, along with example calls.

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Check for Armstrong numbers in a range
Use analyze_numbers function on a sample list
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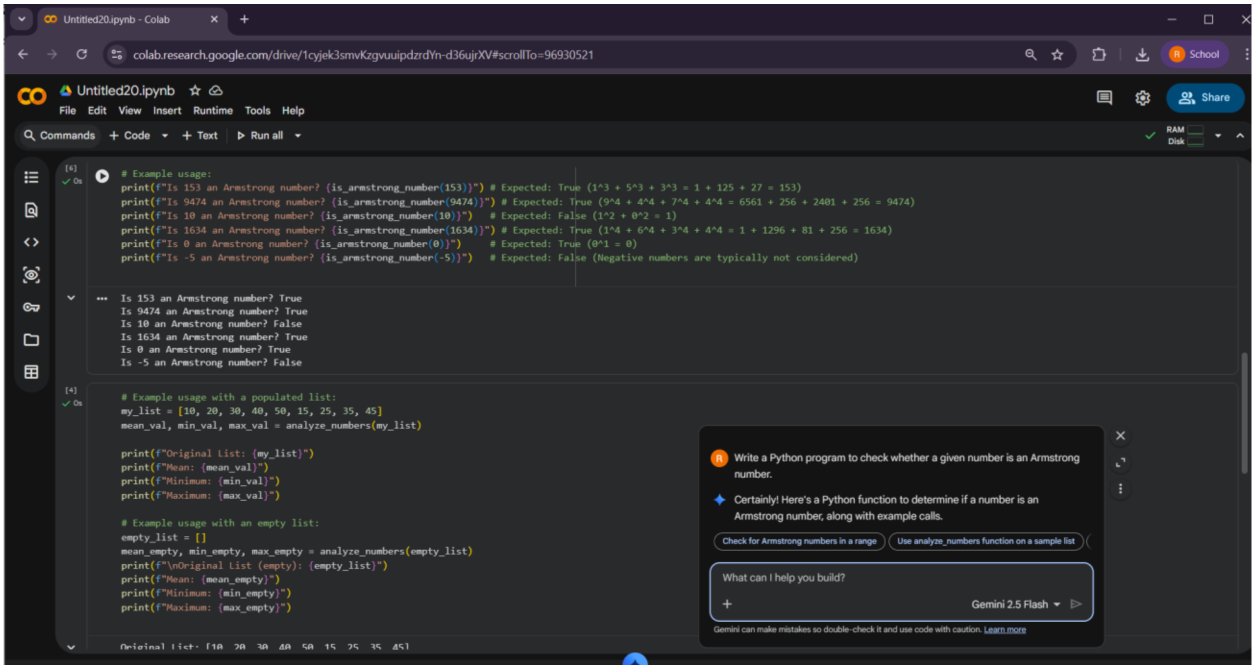

```
# Example usage:
print(f"Is 153 an Armstrong number? {is_armstrong_number(153)}") # Expected: True (1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153)
print(f"Is 9474 an Armstrong number? {is_armstrong_number(9474)}") # Expected: True (9^4 + 4^4 + 7^4 + 4^4 = 6561 + 256 + 2401 + 256 = 9474)
print(f"Is 10 an Armstrong number? {is_armstrong_number(10)}")  # Expected: False (1^2 + 0^2 = 1)
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 0 an Armstrong number? {is_armstrong_number(0)}")     # Expected: True (0^1 = 0)
print(f"Is -5 an Armstrong number? {is_armstrong_number(-5)}")  # Expected: False (Negative numbers are typically not considered)
```

```
Is 153 an Armstrong number? True
Is 9474 an Armstrong number? True
Is 10 an Armstrong number? False
Is 1634 an Armstrong number? True
Is 0 an Armstrong number? True
Is -5 an Armstrong number? False
```

```
# Example usage with a populated list:
my_list = [10, 20, 30, 40, 50, 15, 25, 35, 45]
mean_val, min_val, max_val = analyze_numbers(my_list)

print(f"Original List: {my_list}")
print(f"Mean: {mean_val}")
print(f"Minimum: {min_val}")
print(f"Maximum: {max_val}")

# Example usage with an empty list:
empty_list = []
mean_empty, min_empty, max_empty = analyze_numbers(empty_list)
print(f"\nOriginal List (empty): {empty_list}")
print(f"Mean: {mean_empty}")
print(f"Minimum: {min_empty}")
print(f"Maximum: {max_empty}")
```

```
Original List: [10, 20, 30, 40, 50, 15, 25, 35, 45]
```

Write a Python program to check whether a given number is an Armstrong number.

Certainly! Here's a Python function to determine if a number is an Armstrong number, along with example calls.

Gemini can make mistakes so double-check it and use code with caution. Learn more

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+ Text
Run all
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Disk
[6]
[4]
Check for Armstrong numbers in a range
Use analyze_numbers function on a sample list
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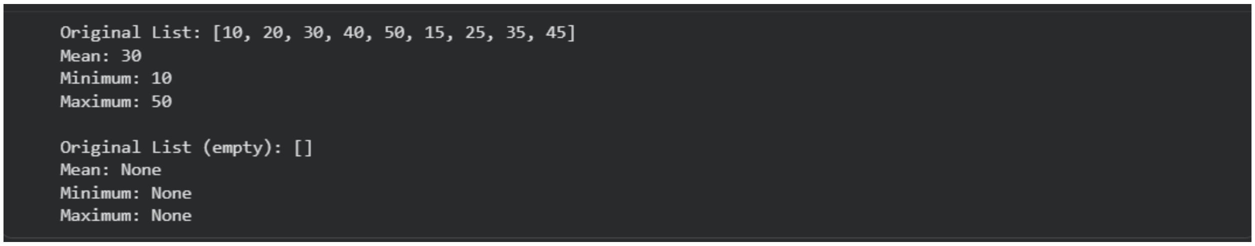
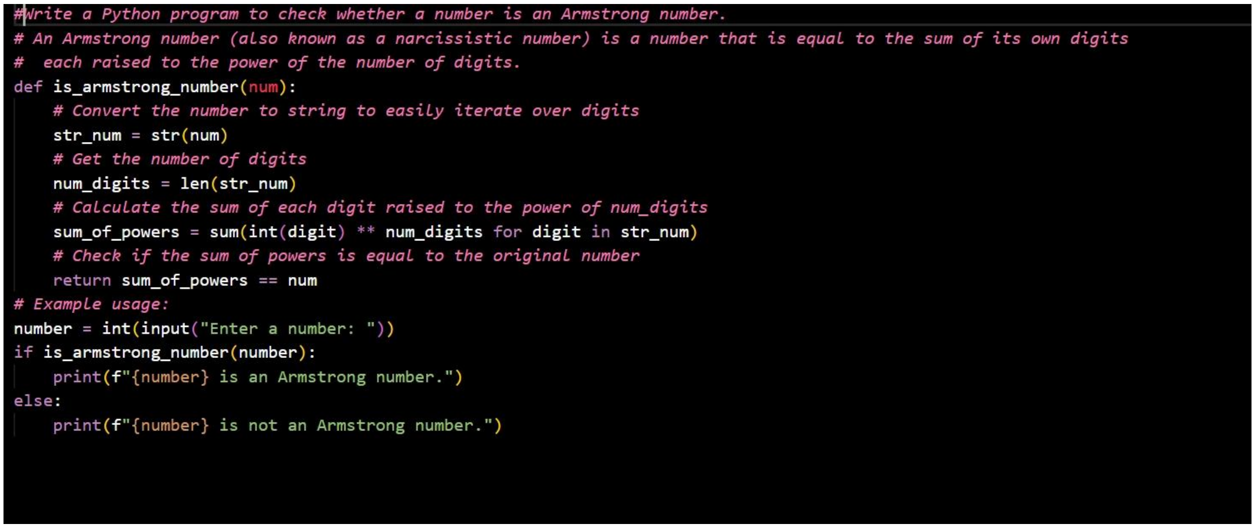
## Output:



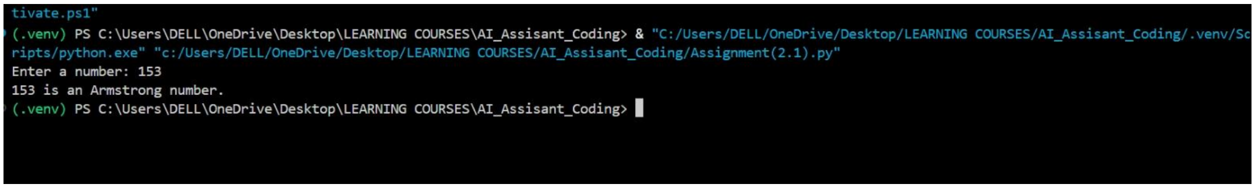
```
Original List: [10, 20, 30, 40, 50, 15, 25, 35, 45]
Mean: 30
Minimum: 10
Maximum: 50

Original List (empty): []
Mean: None
Minimum: None
Maximum: None
```

## Code (Copilot Output):



```python
#Write a Python program to check whether a number is an Armstrong number.
# An Armstrong number (also known as a narcissistic number) is a number that is equal to the sum of its own digits
#  each raised to the power of the number of digits.
def is_armstrong_number(num):
    # Convert the number to string to easily iterate over digits
    str_num = str(num)
    # Get the number of digits
    num_digits = len(str_num)
    # Calculate the sum of each digit raised to the power of num_digits
    sum_of_powers = sum(int(digit) ** num_digits for digit in str_num)
    # Check if the sum of powers is equal to the original number
    return sum_of_powers == num
# Example usage:
number = int(input("Enter a number: "))
if is_armstrong_number(number):
    print(f"{number} is an Armstrong number.")
else:
    print(f"{number} is not an Armstrong number.")
```

## Output:



```
tivate.ps1"
(.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding> & "C:/Users/DELL/OneDrive/Desktop/LEARNING COURSES/AI_Assisant_Coding/.venv/Sc
ripts/python.exe" "c:/Users/DELL/OneDrive/Desktop/LEARNING COURSES/AI_Assisant_Coding/Assignment(2.1).py"
Enter a number: 153
153 is an Armstrong number.
(.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding> █
```

## Justification: (Comparison between Gemini AI and GitHub Copilot)

| Feature | Gemini (Google Colab) | Copilot (VS Code) |
|---|---|---|
| Code clarity | High – code is structured with clear flow and validation | Medium – logic is correct but less structured |
| Use of functions | Yes – uses a well-defined function with validation | Yes – uses a function but with minimal safeguards |
| Readability | Good – descriptive variable names and spacing | Good – concise but slightly compact |
| Comments | More – includes detailed docstring and inline comments | Less – basic comments only |
| Logic approach | Direct – step-by-step logic easy to follow | Optimized – uses concise expressions (generator) |
| Error handling | Present – checks input type and negative values | Not present – assumes valid input |
| Suitability for learning | High – beginner-friendly and explanatory | Medium – better for experienced users |

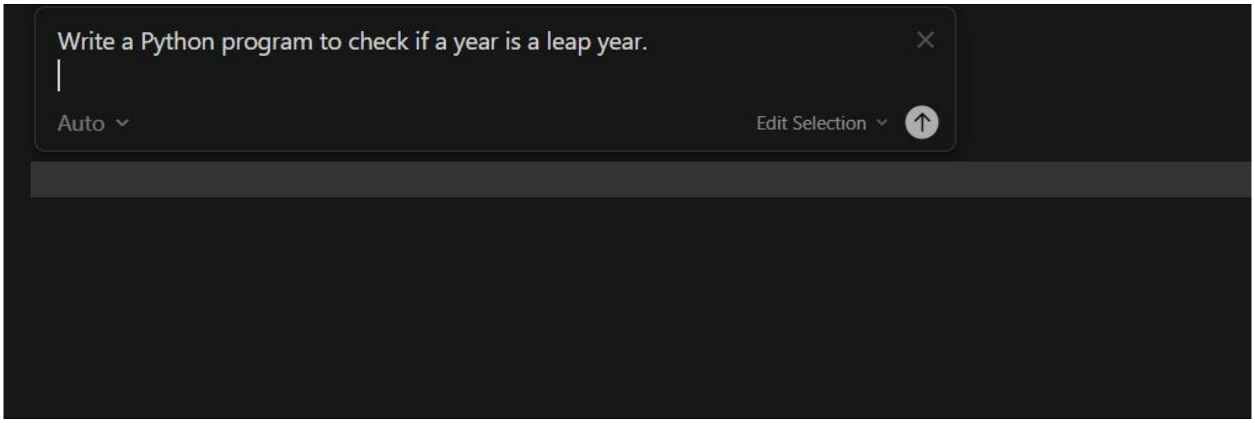
## Task 3: Leap Year Validation Using Cursor AI

### Task

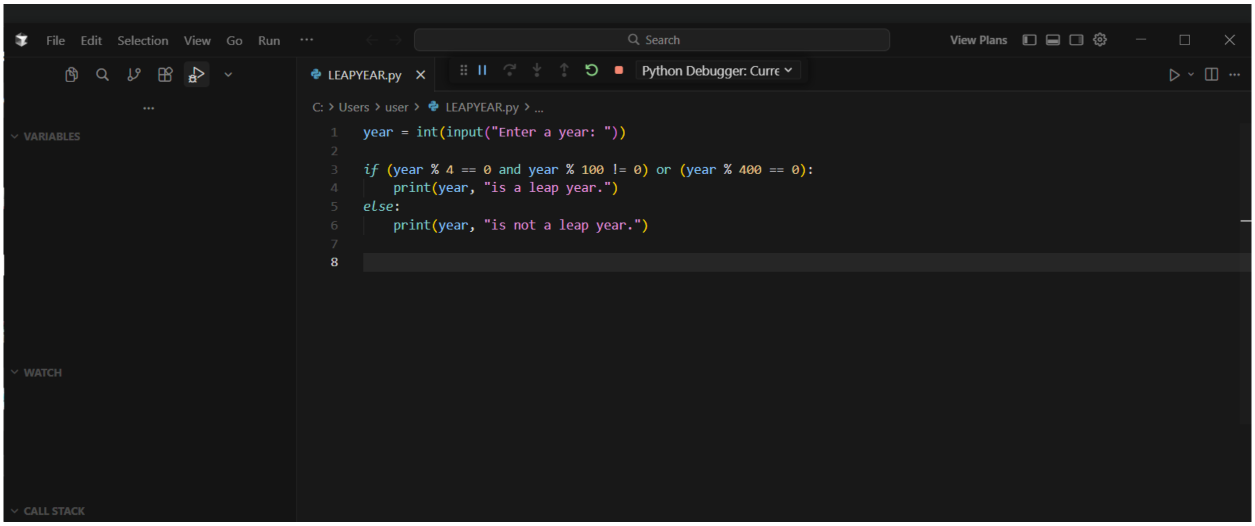
Generate two versions of a Python program to check leap years using different prompts in Cursor AI.

### Prompt 1

"Write a simple Python program to check whether a year is a leap year."

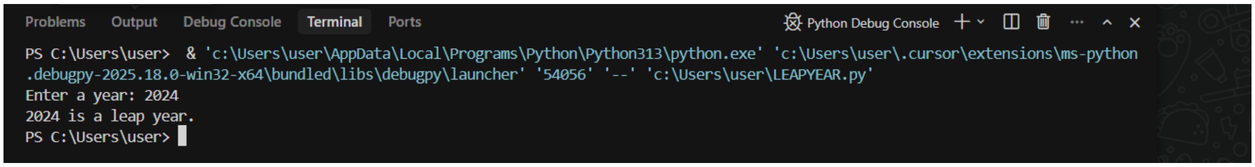


Write a Python program to check if a year is a leap year.



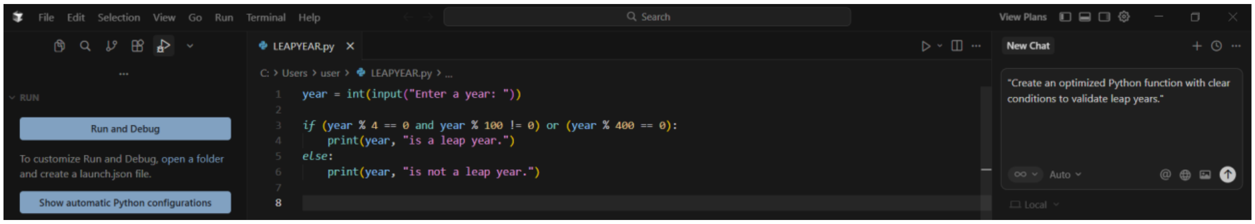
```python
year = int(input("Enter a year: "))

if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
    print(year, "is a leap year.")
else:
    print(year, "is not a leap year.")

```

### Output:



```
PS C:\Users\user>  & 'c:\Users\user\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\user\.cursor\extensions\ms-python
.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '54056' '--' 'c:\Users\user\LEAPYEAR.py'
Enter a year: 2024
2024 is a leap year.
PS C:\Users\user> 
```

## Prompt2:


File Edit Selection View Go Run Terminal Help
Search
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Run and Debug
To customize Run and Debug, open a folder and create a launch.json file.
Show automatic Python configurations
LEAPYEAR.py
C: > Users > user > LEAPYEAR.py > ...
New Chat
Auto
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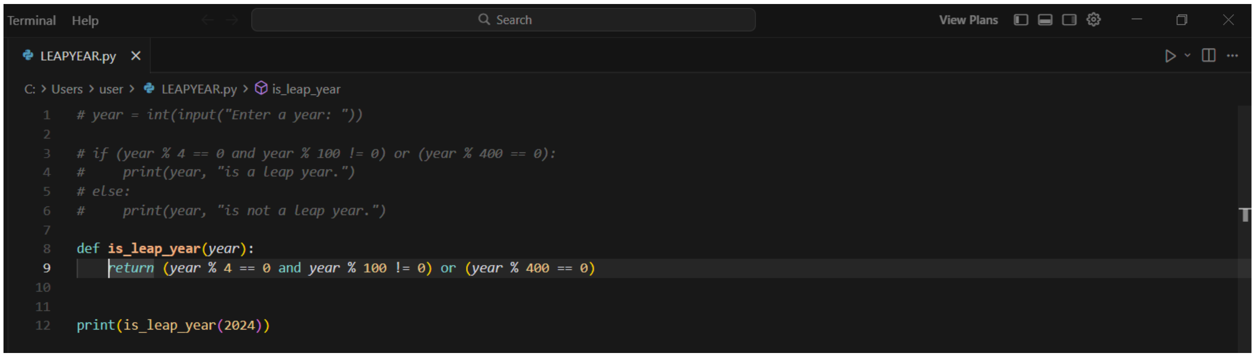
```python
year = int(input("Enter a year: "))

if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
    print(year, "is a leap year.")
else:
    print(year, "is not a leap year.")

```

"Create an optimized Python function with clear conditions to validate leap years."



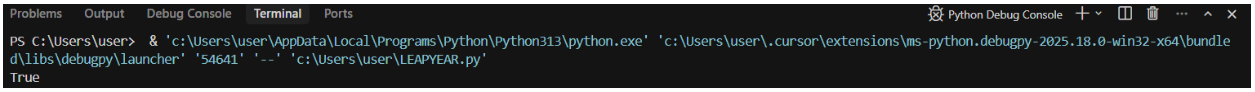
```python
# year = int(input("Enter a year: "))

# if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
#     print(year, "is a leap year.")
# else:
#     print(year, "is not a leap year.")

def is_leap_year(year):
    return (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0)


print(is_leap_year(2024))
```

## Output:



```
PS C:\Users\user> & 'c:\Users\user\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\user\.cursor\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '54641' '--' 'c:\Users\user\LEAPYEAR.py'
True
```

## Justification:

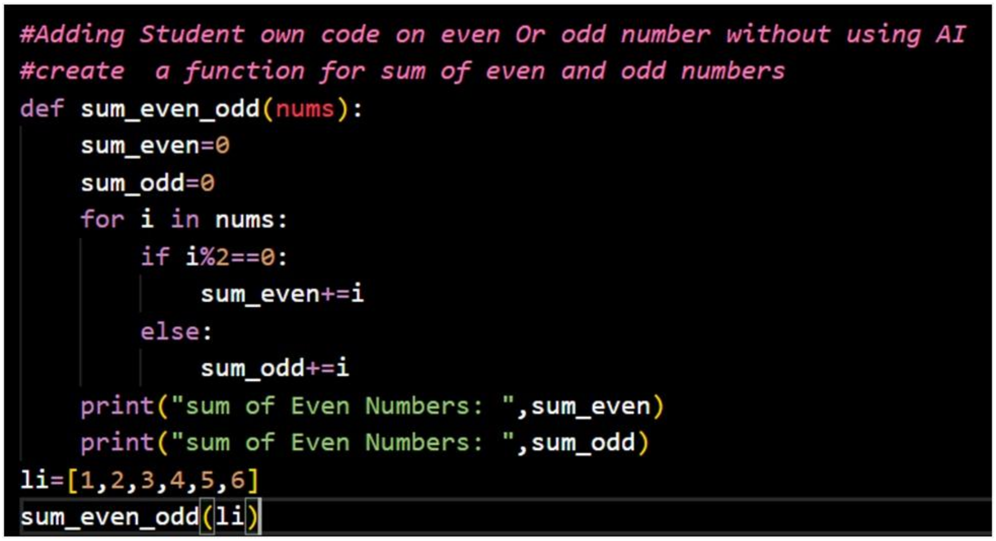
The second version is more modular and reusable. Cursor AI adapts code quality based on prompt specificity, highlighting the importance of precise instructions.

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

## Task

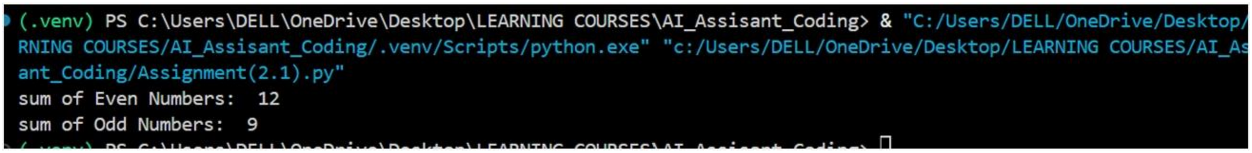
Write a Python program to calculate the sum of odd and even numbers in a tuple, then refactor it using AI.

## Original Code (Student Logic)



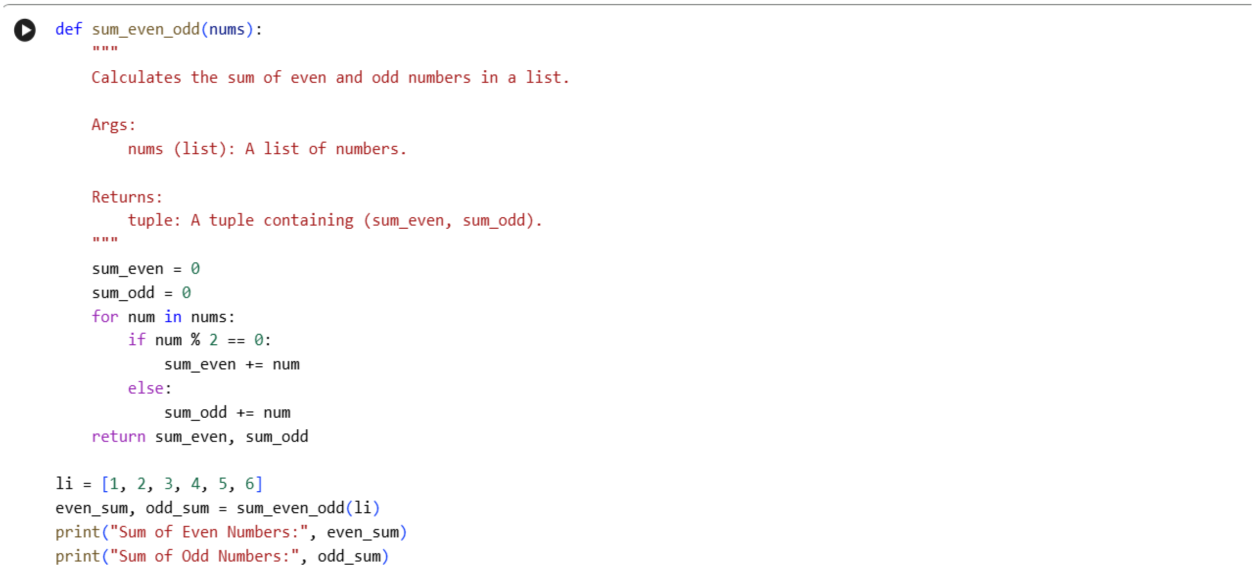
```
#Adding Student own code on even Or odd number without using AI
#create  a function for sum of even and odd numbers
def sum_even_odd(nums):
    sum_even=0
    sum_odd=0
    for i in nums:
        if i%2==0:
            sum_even+=i
        else:
            sum_odd+=i
    print("sum of Even Numbers: ",sum_even)
    print("sum of Even Numbers: ",sum_odd)
li=[1,2,3,4,5,6]
sum_even_odd(li)
```

## Output:



```
(.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding> & "C:/Users/DELL/OneDrive/Desktop/
RNING COURSES/AI_Assisant_Coding/.venv/Scripts/python.exe" "c:/Users/DELL/OneDrive/Desktop/LEARNING COURSES/AI_As
ant_Coding/Assignment(2.1).py"
sum of Even Numbers:  12
sum of Odd Numbers:  9
(.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding>
```

## Refactored Code (AI Assisted)



```
def sum_even_odd(nums):
    """
    Calculates the sum of even and odd numbers in a list.

    Args:
        nums (list): A list of numbers.

    Returns:
        tuple: A tuple containing (sum_even, sum_odd).
    """
    sum_even = 0
    sum_odd = 0
    for num in nums:
        if num % 2 == 0:
            sum_even += num
        else:
            sum_odd += num
    return sum_even, sum_odd

li = [1, 2, 3, 4, 5, 6]
even_sum, odd_sum = sum_even_odd(li)
print("Sum of Even Numbers:", even_sum)
print("Sum of Odd Numbers:", odd_sum)
```

## Output:

```
Sum of Even Numbers: 12
Sum of Odd Numbers: 9
```

**Justification:**

1.Both programs correctly separate even and odd numbers using the modulus (% 2) condition.

2.The first code is student-written and directly prints results, making it easy to understand for beginners.

3.The second code improves structure by using a docstring and returning values instead of printing inside the function.

4. Returning values in the optimized code increases reusability and makes it suitable for larger programs.

5.Overall, the first code is good for learning basic logic, while the second code follows better programming practices.