AIAssistedCoding

Assignment - 02

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Batch:48

Lab2:ExploringAdditionalAICodingToolsbeyondCopilot–Gemini(Colab)andCursorAI

Task1:StatisticalSummaryforSurveyData

- **Scenario:Youareadataanalystinternworkingwithsurveyresponsesstoredas numerical lists.**
  - **Promptused:**
    "WriteaPythonfunctionthattakesalist ofnumbersandreturnsthe mean, minimum, and maximum values."
  - **Generatedcode:**

```
importstatistics
defanalyze_numbers(numbers):
"""
Calculatesthemean,minimum,andmaximumofalistofnumbers.Args:
numbers(list):Alistofnumericalvalues.
Returns:
tuple:Atuplecontaining(mean,minimum,maximum).Returns
(None, None, None) if the list is empty.
"""
ifnotnumbers:
return None, None,None
mean_value=statistics.mean(numbers)
min_value = min(numbers)
max_value= max(numbers)
returnmean_value,min_value,max_value
```

ExampleUsage

```
data=[10,20,30,40,50]
mean,minimum,maximum=analyze_numbers(data)
print(f"List: {data}")
print(f"Mean: {mean}")
print(f"Minimum: {minimum}")
print(f"Maximum:{maximum}")
```

```
data_empty = []
mean_empty,min_empty,max_empty=analyze_numbers(data_empty)
print(f"\nList: {data_empty}")
print(f"Mean: {mean_empty}")
print(f"Minimum:{min_empty}")
print(f"Maximum:{max_empty}")
```

- **SampleOutput:**

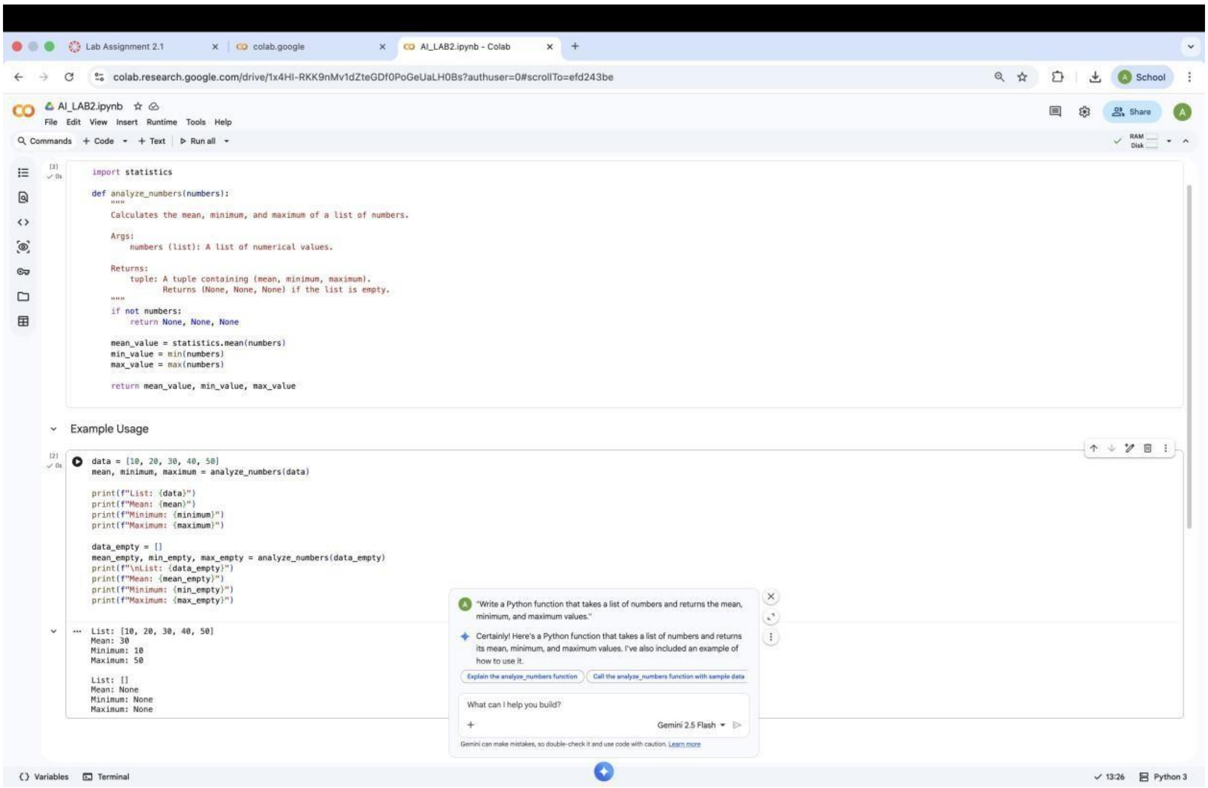
```
List:[10,20,30,40,50]Mean:30Minimum:10Maximum:50List:[]
Mean: None Minimum: None Maximum: None
```

- **ShortExplanationofLogic:**

The**mean** representstheaverageofasetofnumbers. Itisobtained byaddingallthe values in the list and dividing the sum by the total number of elements.

The**minimumvalue**isthesmallestnumberpresentinthelist,andthe**maximumvalue** is the largest number present in the list. These values are calculated using Python’s built-in min() and max() functions.

Thefunctionacceptsalistofnumericalvaluesasinput,computesthemean,minimum,and maximum values, and displays them as a statistical summary of the given data.


Lab Assignment 2.1
colab.google
AI_LAB2.ipynb - Colab
colab.research.google.com/drive/1x4HI-RKK9nMv1dZteGDf0PoGeUaLH0Bs?authuser=0#scrollTo=efd243be
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Python 3

```
import statistics

def analyze_numbers(numbers):
    """
    Calculates the mean, minimum, and maximum of 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
```

Example Usage

```
data = [10, 20, 30, 40, 50]
mean, minimum, maximum = analyze_numbers(data)

print(f"List: {data}")
print(f"Mean: {mean}")
print(f"Minimum: {minimum}")
print(f"Maximum: {maximum}")

data_empty = []
mean_empty, min_empty, max_empty = analyze_numbers(data_empty)
print(f"\nList: {data_empty}")
print(f"Mean: {mean_empty}")
print(f"Minimum: {min_empty}")
print(f"Maximum: {max_empty}")
```

```
List: [10, 20, 30, 40, 50]
Mean: 30
Minimum: 10
Maximum: 50

List: []
Mean: None
Minimum: None
Maximum: None
```

"Write a Python function that takes a list of numbers and returns the mean, minimum, and maximum values."

Certainly! Here's a Python function that takes a list of numbers and returns its mean, minimum, and maximum values. I've also included an example of how to use it.

Explain the analyze_numbers function
Call the analyze_numbers function with sample data
What can I help you build?
Gemini 2.5 Flash
Gemini can make mistakes, so double-check it and use code with caution. Learn more

Task2:ArmstrongNumber–AIComparison

- **Scenario:YouareevaluatingAItoolsfornumericvalidationlogic.**
  - **Promptused(Gemini):**

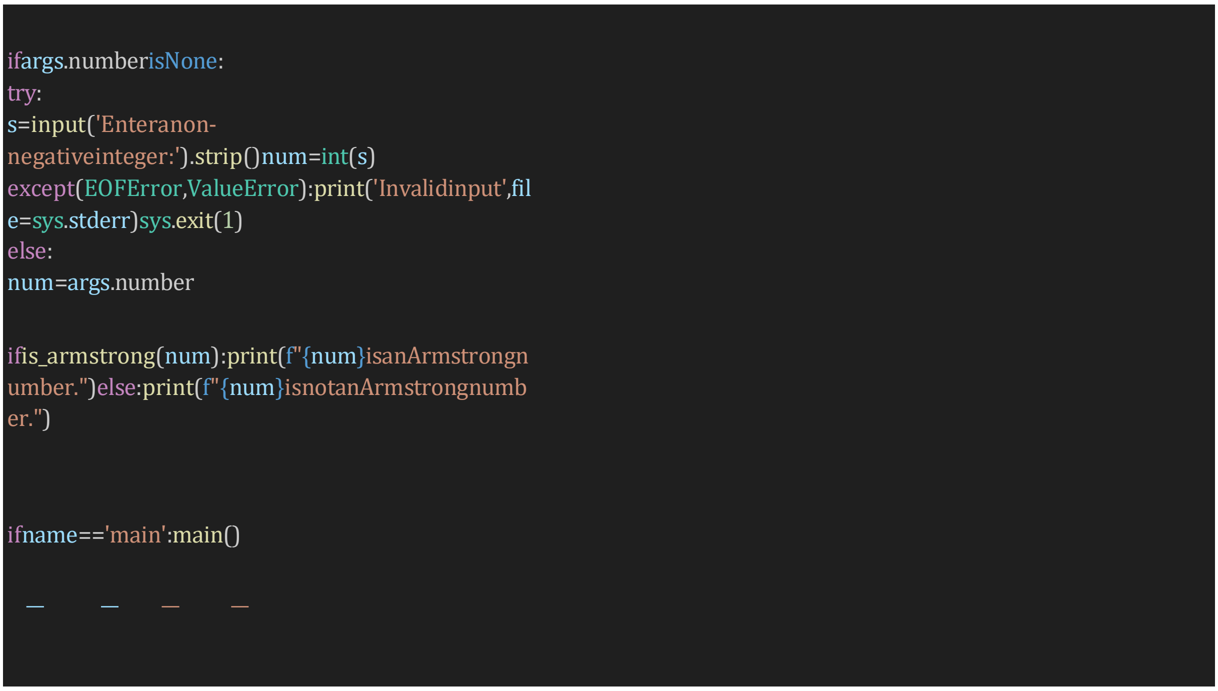
"WriteaPythonprogramtocheckwhetheragivennumberisanArmstrongnumber."

- **Promptused(Copilot):** "WriteaPythonprogramtocheckwhetheragivennumberisanArmstrongnumber."
- **Generatedcode(Gemini):**

```
defis_armstrong_number(number):
""""
Checksifa givennumber isanArmstrongnumber.
AnArmstrongnumber(alsoknownasanarcissisticnumber,
pluperfect digital invariant, or plus perfect number)
isanumberthatisthesumofitsowndigitseachraised to the
power of the number of digits.
rgs:
number(int):Theintegertocheck. Returns:
bool:TrueifthenumberisanArmstrongnumber,Falseotherwise.
""""ifnotisinstance(number,int)ornumber<0: return
False
num_str=str(number)n
= len(num_str)
sum_of_powers=0
for digit_char in num_str:
digit = int(digit_char)
sum_of_powers+=digit**n
returnsum_of_powers==number
```

- **Generatedcode(Copilot):**

```
#!/usr/bin/envpython3"""Armstrongnumberchecke
r(task2).

Usage:
python3task2.py153python3task2.py#promptsforin
put"""importargparsei
mportsys



defis_armstrong(n:int)->bool:
ifn<0:
returnFalsedigits=[int(d)ford
instr(n)]p=len(digits)
returnsum(d**pfordindigits) ==n



defmain() -
>None:parser=argparse.ArgumentParser(description='CheckArmstrongnumber
s')parser.add_argument('number', nargs='?', type=int, help='integer
tocheck')args=parser.parse_args()
```



```
ifargs.numberisNone:
try:
s=input('Enteranon-
negativeinteger:').strip()num=int(s)
except(EOFError,ValueError):print('Invalidinput',fil
e=sys.stderr)sys.exit(1)
else:
num=args.number

ifis_armstrong(num):print(f"{num}isanArmstrongn
umber.")else:print(f"{num}isnotanArmstrongnumb
er.")



ifname=='main':main()

  _    _    _    _
```

- **SampleInput(Gemini):**

```
#Testwithsomenumbers
print(f"Is153anArmstrongnumber?{is_armstrong_number(153)}")#Expected:True(1^3 + 5^3+3^3=1+125+27=153)
print(f"Is9474anArmstrongnumber?{is_armstrong_number(9474)}")#Expected: True (9^4 + 4^4 + 7^4 + 4^4 = 6561 + 256 + 2401 + 256 = 9474)
print(f"Is9anArmstrongnumber?{is_armstrong_number(9)}")#Expected:True(9^1 =9)
print(f"Is10anArmstrongnumber?{is_armstrong_number(10)}")#Expected:False (1^2 + 0^2 = 1 != 10)
print(f"Is123anArmstrongnumber?{is_armstrong_number(123)}")#Expected:False
```

- **SampleInput(Copilot):**

```
Enteranon-negativeinteger:343
```

- **SampleOutput(Gemini):**

```
Is  153  anArmstrong  number?True
Is9474anArmstrongnumber?TrueIs
9 an Armstrong number? True
Is10anArmstrongnumber?False
Is123anArmstrongnumber?False
```

- **SampleOutput(Copilot):**

```
343is notanArmstrongnumber.
```

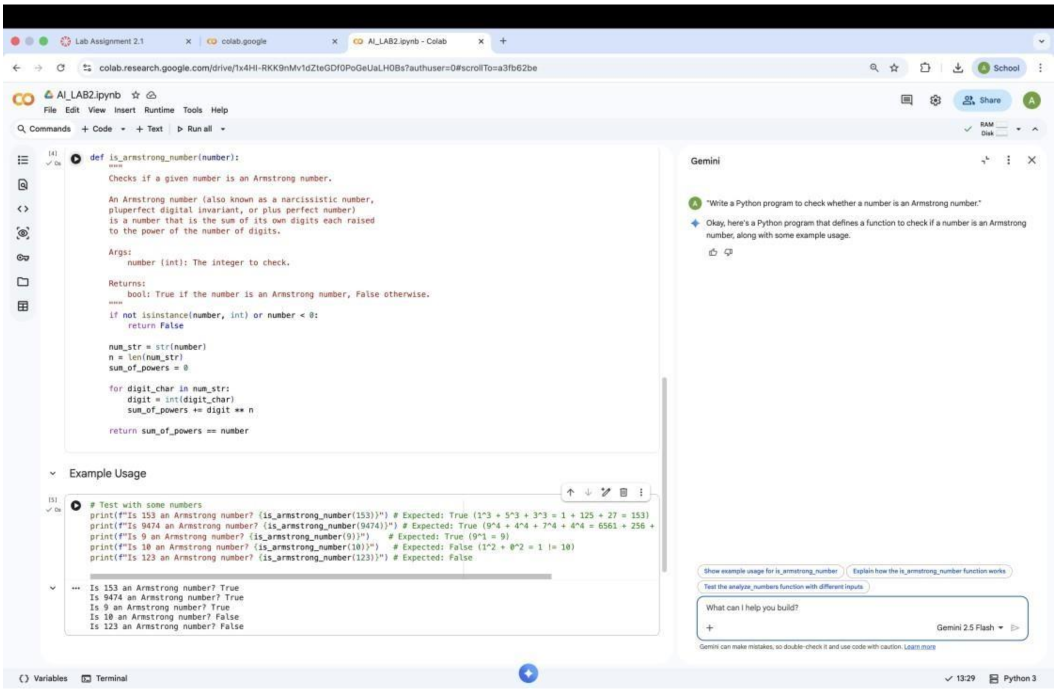
- **Side-by-SideComparisonTable:**

Feature	Google Gemini	GitHub Copilot
Code structure	Uses a separate function	Written directly in main logic
Readability	Very clear and modular	Simple and straightforward
Logic clarity	Easy to understand with function	Easy but less modular
Beginner friendly	High	Medium
Explanation support	Provides explanation along with code	No explanation, only code
Best use case	Learning and documentation	Fast coding inside editor

- **Side-by-SideComparisonTable:**

Analysis : GoogleGeminigenerated awell-structured and modular solution using afunction, making it suitable for learning and reuse. GitHub Copilot produced a concise and direct implementation, which is efficient for quick development withinanIDE. Bothtools correctly implementedtheArmstrongnumberlogic,butGeminiprovidedbetterclarityandexplanation,while Copilot focused on speed and simplicity.

Conclusion : Both AI tools effectively generated correct Armstrong number checking programs. Google Gemini is more helpful for understanding and learning due to its explanations, while GitHub Copilot is ideal for rapid code generation during development.



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

    An Armstrong number (also known as a narcissistic number,
    pluperfect digital invariant, or plus perfect number)
    is a number that is the sum of its own digits each raised
    to the power of the number of digits.

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

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

    num_str = str(number)
    n = len(num_str)
    sum_of_powers = 0

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

    return sum_of_powers == number
```

```
# Test with some numbers
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 +
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 != 10)
print(f"Is 123 an Armstrong number? {is_armstrong_number(123)}") # Expected: False
```

```
Is 153 an Armstrong number? True
Is 9474 an Armstrong number? True
Is 9 an Armstrong number? True
Is 10 an Armstrong number? False
Is 123 an Armstrong number? False
```

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

Okay, here's a Python program that defines a function to check if a number is an Armstrong number, along with some example usage.

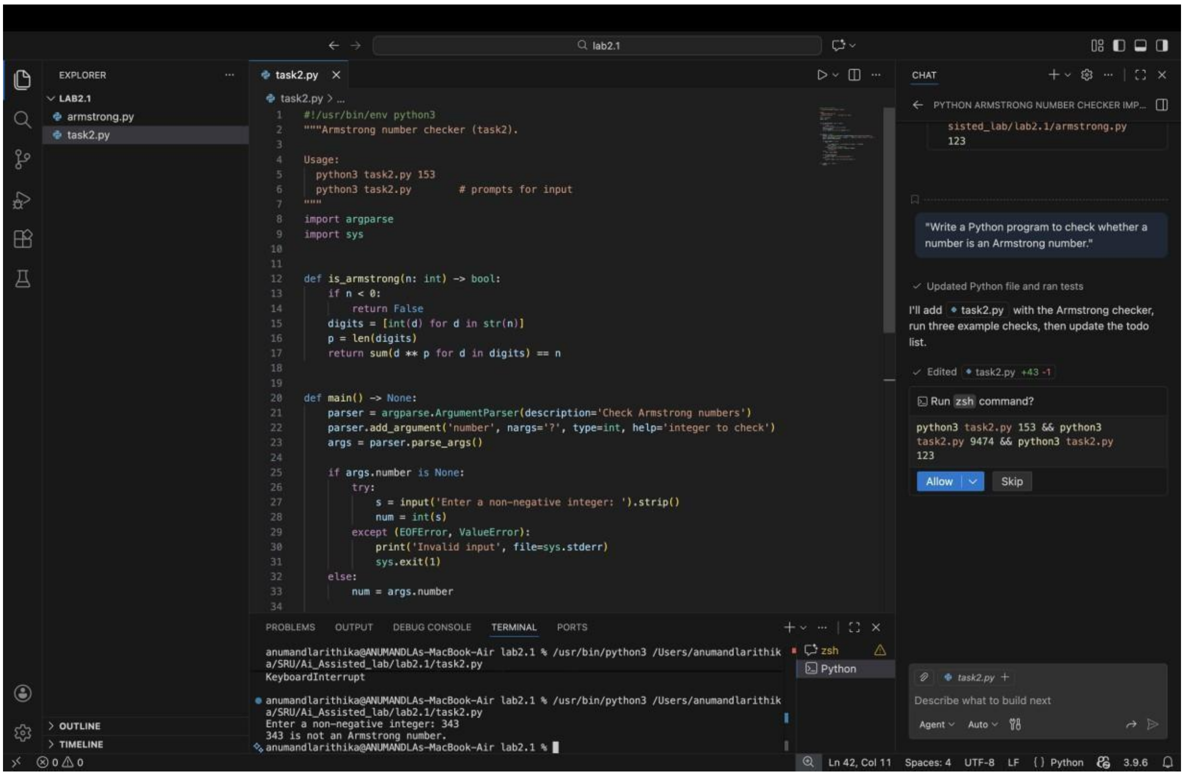
Show example usage for is_armstrong_number

Explain how the is_armstrong_number function works

Test the analyze_numbers function with different inputs

What can I help you build?

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



```python
#!/usr/bin/env python3
"""Armstrong number checker (task2).

Usage:
  python3 task2.py 153
  python3 task2.py        # prompts for input
"""
import argparse
import sys


def is_armstrong(n: int) -> bool:
    if n < 0:
        return False
    digits = [int(d) for d in str(n)]
    p = len(digits)
    return sum(d ** p for d in digits) == n


def main() -> None:
    parser = argparse.ArgumentParser(description='Check Armstrong numbers')
    parser.add_argument('number', nargs='?', type=int, help='integer to check')
    args = parser.parse_args()

    if args.number is None:
        try:
            s = input('Enter a non-negative integer: ').strip()
            num = int(s)
        except (EOFError, ValueError):
            print('Invalid input', file=sys.stderr)
            sys.exit(1)
    else:
        num = args.number

```

```
anumandlarithika@ANUMANDLAs-MacBook-Air lab2.1 % /usr/bin/python3 /Users/anumandlarithik
a/SRU/Ai_Assisted_lab/lab2.1/task2.py
KeyboardInterrupt

anumandlarithika@ANUMANDLAs-MacBook-Air lab2.1 % /usr/bin/python3 /Users/anumandlarithik
a/SRU/Ai_Assisted_lab/lab2.1/task2.py
Enter a non-negative integer: 343
343 is not an Armstrong number.
anumandlarithika@ANUMANDLAs-MacBook-Air lab2.1 % 
```

```
sisted_lab/lab2.1/armstrong.py
123
```

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

✓ Updated Python file and ran tests

I'll add task2.py with the Armstrong checker, run three example checks, then update the todo list.

✓ Edited task2.py +43 -1

Run zsh command?

```
python3 task2.py 153 && python3
task2.py 9474 && python3 task2.py
123
```

Task3:LeapYearValidationUsingCursorAI

- **Scenario:Youarevalidatingacalendarmoduleforabackendsystem.**
  - **Prompt1:** "WriteaPythonprogramtocheckwhetheragivenyearisaleapyear."
  - **Generatedcode:**

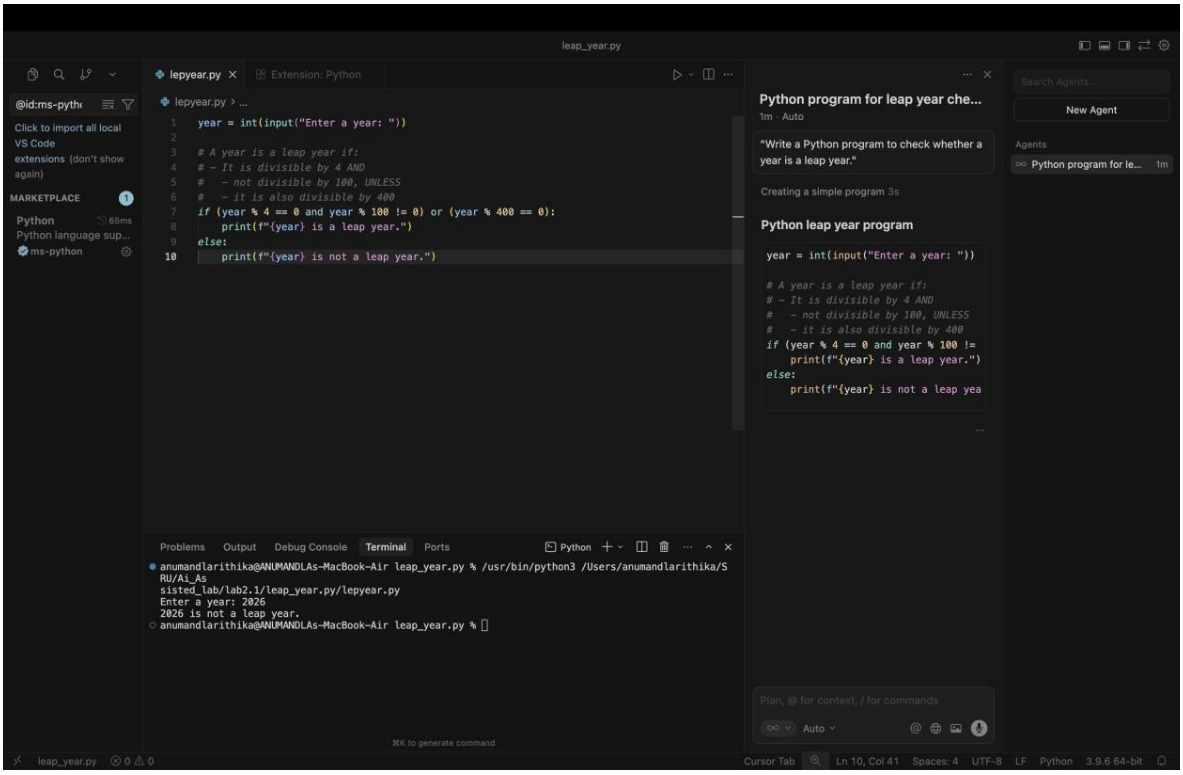
```
year=int(input("Enterayear:"))#
A year is a leap year if:
#-Itisdivisibleby4AND
#-notdivisibleby100,UNLESS#-it is
also divisible by 400
if(year%4==0andyear%100!=0)or(year%400==0): print(f"{year}
    is a leap year.")
else:
    print(f"{year}isnotaleapyear.")
```

  - **Prompt2:** "WriteanoptimizedPythonprogramwithproperconditionsandcommentstocheckwhether a year is a leap year."
  - **Generatedcode:**

```
year=int(input("Enterayear:"))

#Ayearis aleapyearif:
#1.Itisdivisibleby400→leapyear
#2.Elseifitisdivisibleby100→notaleapyear#3.
Else if it is divisible by 4 → leap
year#4.Otherwise→notaleapyear
```

```
if year % 400
==0:print(f"{year}isaleapyear.")
elif year % 100 ==
0:print(f"{year}isnotaleapyear."
)elif year % 4
==0:print(f"{year}isaleapyear.")
else:
print(f"{year}isnotaleapyear.")
```

- **SampleInput:**
  Enterayear:2026
- **SampleOutput:**
  2026isnotaleapyear.
- **ShortExplanationofLogic:**
  ThefirstversionofthecodegeneratedbyCursorAIprovidedbasicleapyearvalidationlogic. Thesecondpromptresultedinimprovedcodewithbetterreadabilityandclear commentsexplainingtheconditions.Theoptimizedversioniseasiertounderstand and more suitable for real-world applications.



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

# A year is a leap year if:
# - It is divisible by 4 AND
#   - not divisible by 100, UNLESS
#   - it is also divisible by 400
if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
    print(f"{year} is a leap year.")
else:
    print(f"{year} is not a leap year.")
```

Python program for leap year che...
1m · Auto

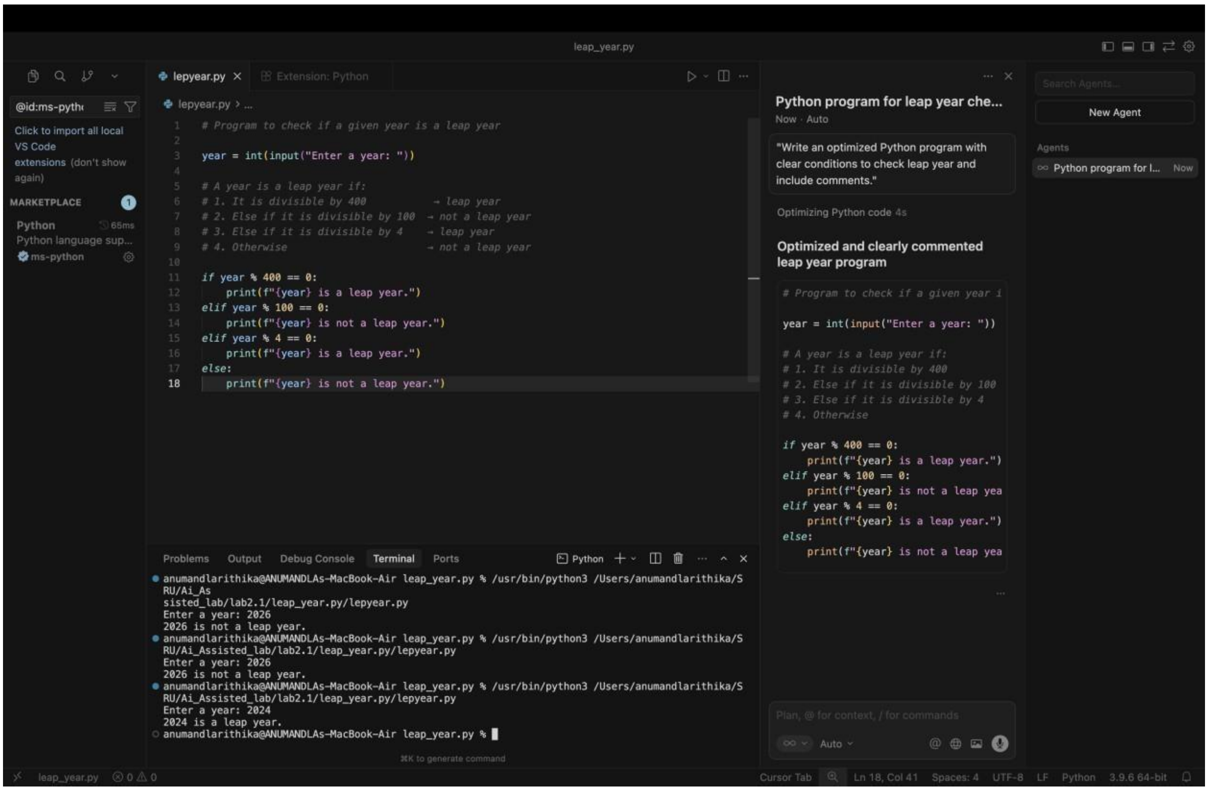
"Write a Python program to check whether a year is a leap year."

Creating a simple program 3s

Python leap year program

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

# A year is a leap year if:
# - It is divisible by 4 AND
#   - not divisible by 100, UNLESS
#   - it is also divisible by 400
if (year % 4 == 0 and year % 100 !=
    print(f"{year} is a leap year.")
else:
    print(f"{year} is not a leap yea
```

```
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_As
sisted_lab/lab2.1/leap_year.py/lepyear.py
Enter a year: 2026
2026 is not a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % 
```



```python
# Program to check if a given year is a leap year

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

# A year is a leap year if:
# 1. It is divisible by 400          → leap year
# 2. Else if it is divisible by 100  → not a leap year
# 3. Else if it is divisible by 4    → leap year
# 4. Otherwise                       → not a leap year

if year % 400 == 0:
    print(f"{year} is a leap year.")
elif year % 100 == 0:
    print(f"{year} is not a leap year.")
elif year % 4 == 0:
    print(f"{year} is a leap year.")
else:
    print(f"{year} is not a leap year.")
```

```
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_As
sisted_lab/lab2.1/leap_year.py/lepyear.py
Enter a year: 2026
2026 is not a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_Assisted_lab/lab2.1/leap_year.py/lepyear.py
Enter a year: 2026
2026 is not a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_Assisted_lab/lab2.1/leap_year.py/lepyear.py
Enter a year: 2024
2024 is a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py %
```

Python program for leap year che...

Now · Auto

"Write an optimized Python program with clear conditions to check leap year and include comments."

Optimizing Python code 4s

Optimized and clearly commented leap year program

```python
# Program to check if a given year i

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

# A year is a leap year if:
# 1. It is divisible by 400
# 2. Else if it is divisible by 100
# 3. Else if it is divisible by 4
# 4. Otherwise

if year % 400 == 0:
    print(f"{year} is a leap year.")
elif year % 100 == 0:
    print(f"{year} is not a leap yea
elif year % 4 == 0:
    print(f"{year} is a leap year.")
else:
    print(f"{year} is not a leap yea
```

Task4:StudentLogic+AIRefactoring(Odd/EvenSum)

- **Scenario:Companypolicyrequiresdeveloperstowritelogicbeforeusing AI.**
  - **Promptused:**
    "RefactorthisPythoncodetoimprovereadabilityandefficiency."
  - **StudentCode:**

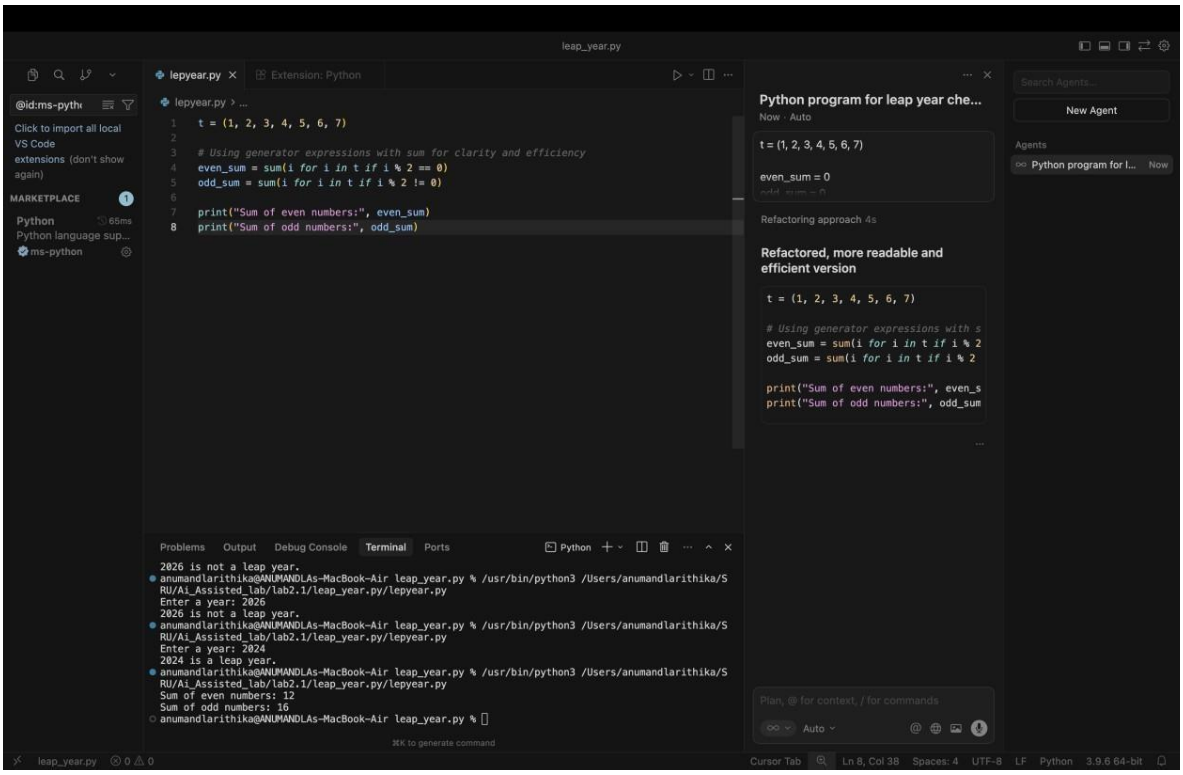
```
T=(1,2,3,4,5,6,7)
even_sum=0
odd_sum=0for
i in t:
if i% 2 == 0:
even_sum=even_sum+i else:
odd_sum= odd_sum+ i
print("Sumofevennumbers:",even_sum)
print("Sumofoddnumbers:",odd_sum)
```

  - **AICode:**

```
t=(1,2,3,4,5,6,7)

#Usinggeneratorexpressionswithsumforclarityandefficiency
even_sum=sum(iforintifi%2==0)odd_sum=
sum(i for i in t if i % 2 != 0)

print("Sumofevennumbers:",even_sum)print("Sumo
f odd numbers:", odd_sum)
```

- **SampleOutput:**

  Sumofevennumbers:12
  Sumofoddnumbers:16



Click to import all local VS Code extensions (don't show again)

```
t = (1, 2, 3, 4, 5, 6, 7)

# Using generator expressions with sum for clarity and efficiency
even_sum = sum(i for i in t if i % 2 == 0)
odd_sum = sum(i for i in t if i % 2 != 0)

print("Sum of even numbers:", even_sum)
print("Sum of odd numbers:", odd_sum)
```

```
2026 is not a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_Assisted_lab/lab2.1/leap_year.py/lepyear.py
Enter a year: 2026
2026 is not a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_Assisted_lab/lab2.1/leap_year.py/lepyear.py
Enter a year: 2024
2024 is a leap year.
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % /usr/bin/python3 /Users/anumandlarithika/S
RU/Ai_Assisted_lab/lab2.1/leap_year.py/lepyear.py
Sum of even numbers: 12
Sum of odd numbers: 16
anumandlarithika@ANUMANDLAs-MacBook-Air leap_year.py % 
```

Python program for leap year che...

Now · Auto

```
t = (1, 2, 3, 4, 5, 6, 7)

even_sum = 0
```

Refactoring approach 4s

Refactored, more readable and efficient version

```
t = (1, 2, 3, 4, 5, 6, 7)

# Using generator expressions with s
even_sum = sum(i for i in t if i % 2
odd_sum = sum(i for i in t if i % 2

print("Sum of even numbers:", even_s
print("Sum of odd numbers:", odd_sum
```