

# ASSIGNMENT-13.5

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BATCH-29

## TASK-1

### PROMPT:

""You are given a Python script that contains repeated logic.

Your task is to:

1. Identify duplicate code blocks.
2. Refactor them into a reusable function.
3. Ensure the output remains the same as the original code.
4. Add proper docstrings to all functions.

Legacy Code:

```
print("Area of Rectangle:", 5 * 10)
```

```
print("Perimeter of Rectangle:", 2 * (5 + 10))
```

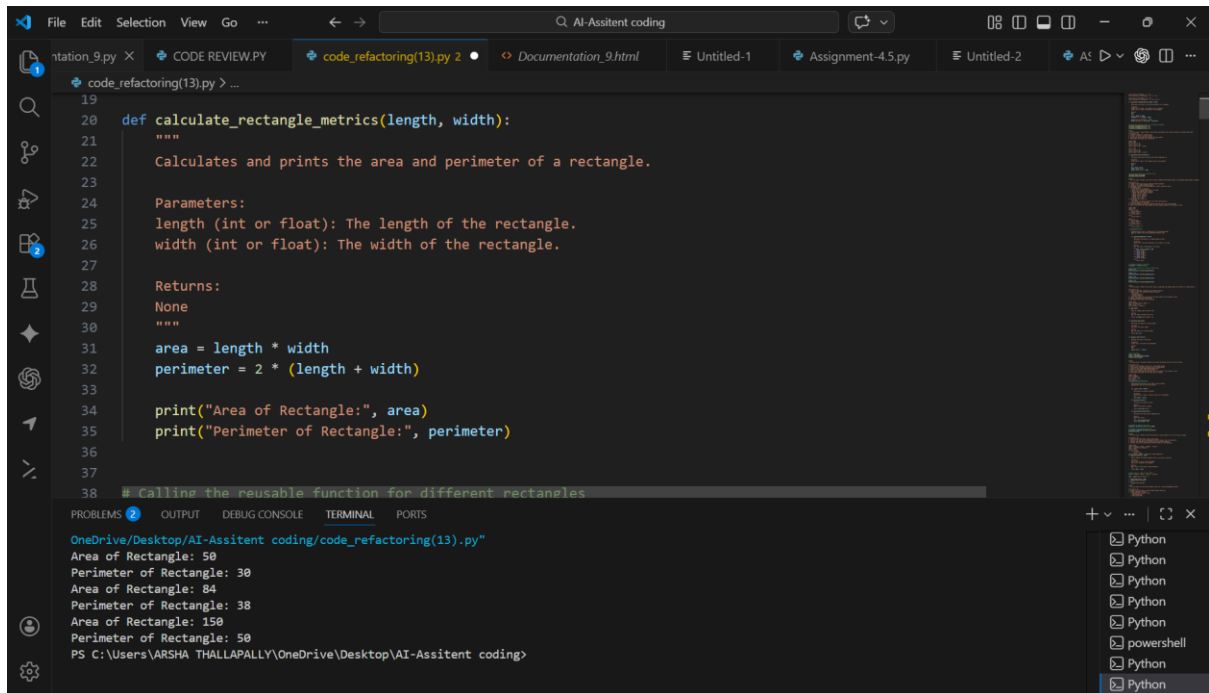
```
print("Area of Rectangle:", 7 * 12)
```

```
print("Perimeter of Rectangle:", 2 * (7 + 12))
```

```
print("Area of Rectangle:", 10 * 15)
```

```
print("Perimeter of Rectangle:", 2 * (10 + 15))"""
```

## CODE:



```
19
20 def calculate_rectangle_metrics(length, width):
21     """
22     Calculates and prints the area and perimeter of a rectangle.
23
24     Parameters:
25     length (int or float): The length of the rectangle.
26     width (int or float): The width of the rectangle.
27
28     Returns:
29     None
30     """
31     area = length * width
32     perimeter = 2 * (length + width)
33
34     print("Area of Rectangle:", area)
35     print("Perimeter of Rectangle:", perimeter)
36
37
38 # Call the reusable function for different rectangles

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL PORTS
OneDrive/Desktop/AI-Assitent coding/code_refactoring(13).py"
Area of Rectangle: 50
Perimeter of Rectangle: 30
Area of Rectangle: 84
Perimeter of Rectangle: 38
Area of Rectangle: 150
Perimeter of Rectangle: 50
PS C:\Users\ARSHA THALLAPALLY\OneDrive\Desktop\AI-Assitent coding>
```

## OBSERVATION:

Duplicate logic is removed by introducing reusable functions.  
Code becomes easier to maintain and modify in one place.  
Output remains unchanged while structure improves.

## TASK-2

### PROMPT:

You are given a legacy Python script where calculations are written directly in the main code block.

Your task is to:

1. Identify repeated or related logic.
2. Extract it into a reusable function.
3. Ensure the refactored code produces the same output.
4. Add proper docstrings for the function.

## Legacy Code:

```
price = 250

tax = price * 0.18

total = price + tax

print("Total Price:", total)
```

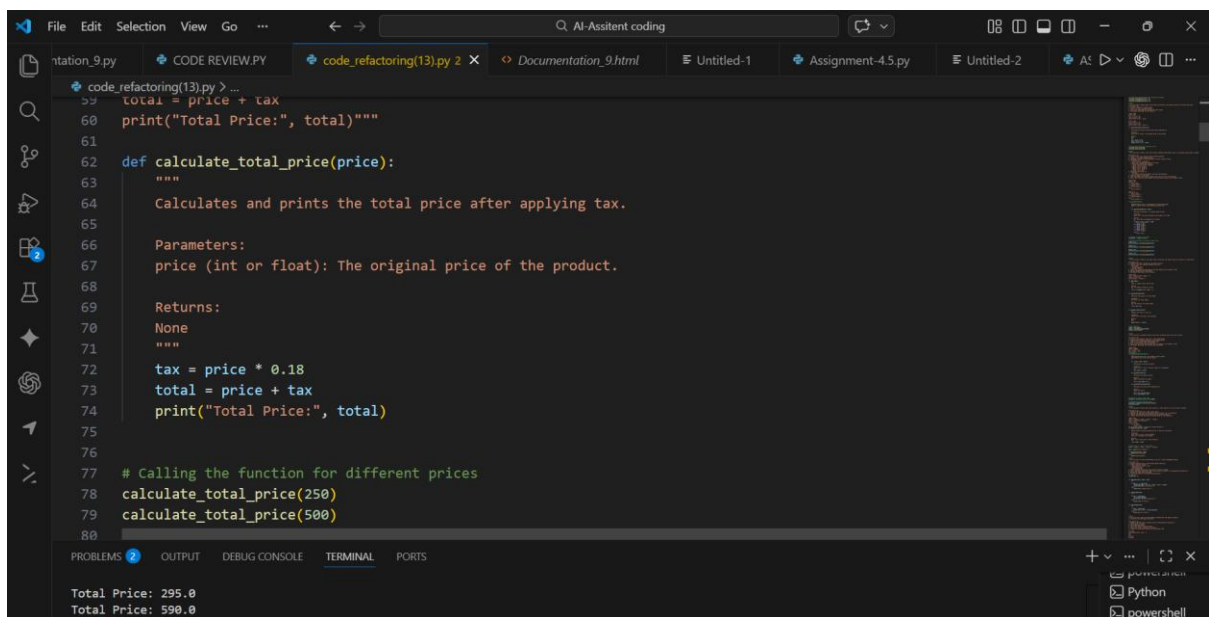
```
price = 500

tax = price * 0.18

total = price + tax

print("Total Price:", total)
```

## CODE:

A screenshot of a code editor interface, likely Visual Studio Code, showing a Python file named 'code\_refactoring(13).py'. The code defines a function 'calculate\_total\_price(price)' that calculates the total price including tax (18%) and prints it. The function is called twice with inputs 250 and 500. The terminal at the bottom shows the output: 'Total Price: 295.0' and 'Total Price: 590.0'. The editor has a dark theme and various icons on the left sidebar.

```
File Edit Selection View Go ...  
code_refactoring(13).py ... Documentation_9.html ... Assignment-4.5.py ...  
code_refactoring(13).py > ...  
60 total = price + tax  
61 print("Total Price:", total)"""  
62  
63 def calculate_total_price(price):  
64     """  
65     Calculates and prints the total price after applying tax.  
66  
67     Parameters:  
68     price (int or float): The original price of the product.  
69  
70     Returns:  
71     None  
72     """  
73     tax = price * 0.18  
74     total = price + tax  
75     print("Total Price:", total)  
76  
77 # Calling the function for different prices  
78 calculate_total_price(250)  
79 calculate_total_price(500)  
80  
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS  
Total Price: 295.0  
Total Price: 590.0  
Python  
powershell
```

## OBSERVATION:

Inline calculations are extracted into a reusable function.  
Logic and output handling are clearly separated.  
Code becomes more readable and testable.

# TASK-3

## PROMPT:

""You are given a Python script that contains repeated if-elif-else logic for assigning grades based on student marks.

Your task is to:

1. Refactor the script using an object-oriented approach.
2. Create a class named GradeCalculator.
3. Implement a method calculate\_grade(self, marks) inside the class.
4. The method must:
  - Accept marks as a parameter.
  - Return the corresponding grade as a string.
  - Follow this grading logic exactly:
    - Marks  $\geq 90$  and  $\leq 100 \rightarrow$  "Grade A"
    - Marks  $\geq 80 \rightarrow$  "Grade B"
    - Marks  $\geq 70 \rightarrow$  "Grade C"
    - Marks  $\geq 40 \rightarrow$  "Grade D"
    - Marks  $\geq 0 \rightarrow$  "Fail"
5. Add proper docstrings for:
  - The class
  - The method (including parameter and return descriptions).
6. Create an object of the class.
7. Call the method for different student marks and print the returned grade.
8. Ensure the refactored code produces the same logical output as the original script.

Legacy Code:

```
marks = 85
```

```
if marks >= 90:
```

```

        print("Grade A")
elif marks >= 75:
    print("Grade B")
else:
    print("Grade C")

marks = 72

if marks >= 90:
    print("Grade A")
elif marks >= 75:
    print("Grade B")
else:
    print("Grade C")"""

```

## CODE:

```

121 class GradeCalculator:
122     def calculate_grade(self, marks):
144         return "Grade D"
145     else:
146         return "Fail"
147
148
149 # Creating an object of the class
150 calculator = GradeCalculator()
151
152 # Calling the method for different student marks
153 marks1 = 85
154 print(calculator.calculate_grade(marks1))
155
156 marks2 = 72
157 print(calculator.calculate_grade(marks2))
158
159 marks3 = 95
160 print(calculator.calculate_grade(marks3))
161
162 marks4 = 35
163 print(calculator.calculate_grade(marks4))
164

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

Grade B
Grade C
Grade A

```

## OBSERVATION:

Repeated conditional grading logic is centralized into a single method.

Object-oriented design improves modularity and reusability.

Future grading rule changes require modification in only one place.

## TASK-4

### PROMPT:

""You are given a Python script where input, processing, and output logic are written in a single block.

Your task is to:

1. Identify the input, processing, and output sections.
2. Refactor them into separate reusable functions:
  - get\_input()
  - calculate\_square()
  - display\_result()
3. Ensure the refactored code produces the same output as the original script.
4. Improve readability and modularity.
5. Add proper docstrings to all functions.

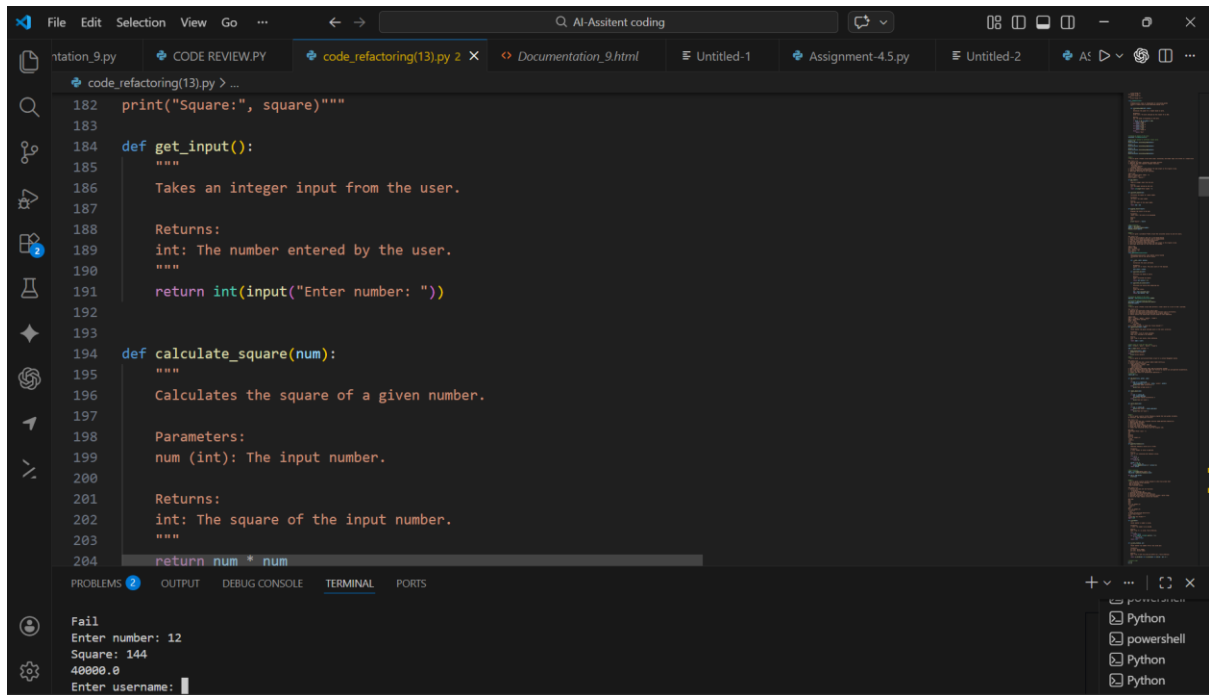
Legacy Code:

```
num = int(input("Enter number: "))
```

```
square = num * num
```

```
print("Square:", square)"""
```

## CODE:



```
code_refactoring(13).py > ...
182 print("Square:", square)"""
183
184 def get_input():
185     """
186     Takes an integer input from the user.
187
188     Returns:
189     int: The number entered by the user.
190     """
191     return int(input("Enter number: "))
192
193
194 def calculate_square(num):
195     """
196     Calculates the square of a given number.
197
198     Parameters:
199     num (int): The input number.
200
201     Returns:
202     int: The square of the input number.
203     """
204     return num * num
```

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL PORTS

Fail  
Enter number: 12  
Square: 144  
40000.0  
Enter username:

## OBSERVATION:

Input, processing, and output responsibilities are separated into functions.

Readability improves by giving meaningful function names.

Behavior remains the same while structure becomes modular.

## TASK-5

### PROMPT:

""You are given a procedural Python script that calculates salary tax and net salary.

Your task is to:

1. Refactor the procedural code into a class-based design.
2. Apply object-oriented principles such as encapsulation.
3. Create a class named EmployeeSalaryCalculator.
4. Move the calculation logic into methods.
5. Ensure the refactored code produces the same output as the original script.
6. Add proper docstrings for the class and its methods.

Legacy Code:

```
salary = 50000
```

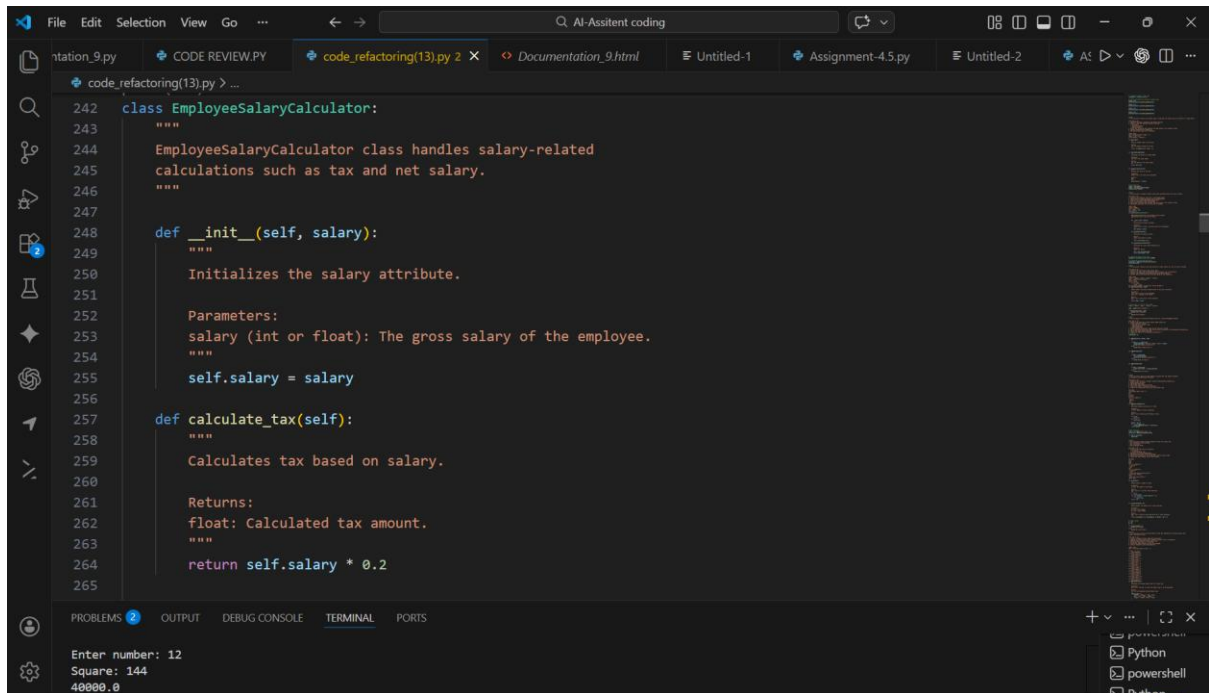
```
tax = salary * 0.2
```

```
net = salary - tax
```

```
print(net)"""
```



## CODE:



The screenshot shows a code editor with a dark theme. The main window displays a Python class named `EmployeeSalaryCalculator`. The class has a docstring describing its purpose: "EmployeeSalaryCalculator class handles salary-related calculations such as tax and net salary." It includes an `__init__` method that initializes the `salary` attribute and a `calculate_tax` method that calculates tax based on the salary. The `calculate_tax` method returns the calculated tax amount. The code is well-commented and uses docstrings for documentation. The editor's interface includes a sidebar with icons for Explorer, Search, Source Control, Run and Debug, and Extensions. The bottom panel shows the PROBLEMS, OUTPUT, DEBUG CONSOLE, and TERMINAL tabs. The TERMINAL tab is active, displaying the output of a program: "Enter number: 12", "Square: 144", and "40000.0".

```
242 class EmployeeSalaryCalculator:
243     """
244     EmployeeSalaryCalculator class handles salary-related
245     calculations such as tax and net salary.
246     """
247
248     def __init__(self, salary):
249         """
250         Initializes the salary attribute.
251
252         Parameters:
253         salary (int or float): The gross salary of the employee.
254         """
255         self.salary = salary
256
257     def calculate_tax(self):
258         """
259         Calculates tax based on salary.
260
261         Returns:
262         float: Calculated tax amount.
263         """
264         return self.salary * 0.2
265
```

## OBSERVATION:

Procedural salary logic is converted into a class-based design.  
Encapsulation improves data handling and security.  
Code becomes scalable for multiple employees.

## TASK-6

### PROMPT:

""""You are given a Python script that performs a linear search on a list to find a username.

Your task is to:

1. Identify the inefficient linear search logic.
2. Refactor the code using an appropriate data structure (set or dictionary).

3. Improve time complexity while preserving the original behavior.
4. Clearly justify the chosen data structure based on time complexity.

Legacy Code:

```
users = ["admin", "guest", "editor", "viewer"]
```

```
name = input("Enter username: ")
```

```
found = False
```

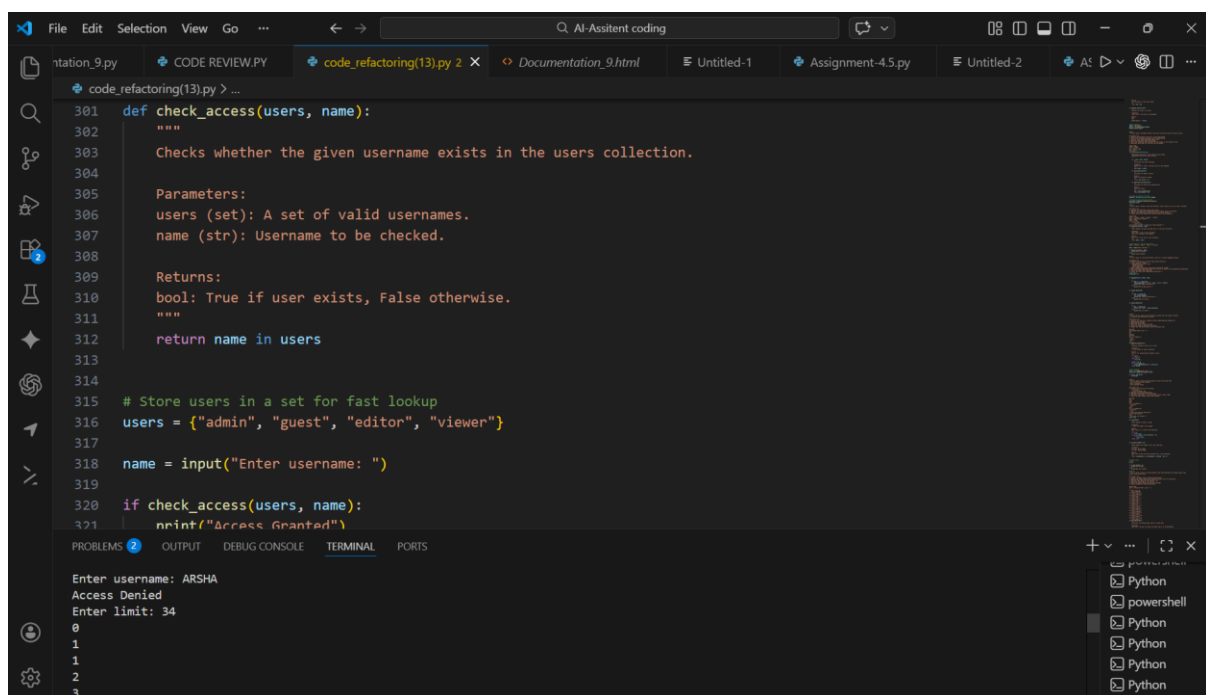
```
for u in users:
```

```
    if u == name:
```

```
        found = True
```

```
print("Access Granted" if found else "Access Denied")"""
```

CODE:



```
File Edit Selection View Go ...
code_refactoring(13).py x Documentation_9.html Untitled-1 Assignment-4.5.py Untitled-2
code_refactoring(13).py > ...
301 def check_access(users, name):
302     """
303     Checks whether the given username exists in the users collection.
304
305     Parameters:
306     users (set): A set of valid usernames.
307     name (str): Username to be checked.
308
309     Returns:
310     bool: True if user exists, False otherwise.
311     """
312     return name in users
313
314
315 # Store users in a set for fast lookup
316 users = {"admin", "guest", "editor", "viewer"}
317
318 name = input("Enter username: ")
319
320 if check_access(users, name):
321     print("Access Granted")
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```

## OBSERVATION:

Linear search is replaced with faster data structure lookup.  
Time complexity is reduced from  $O(n)$  to  $O(1)$  on average.  
Logic becomes simpler and more efficient.

## TASK-7

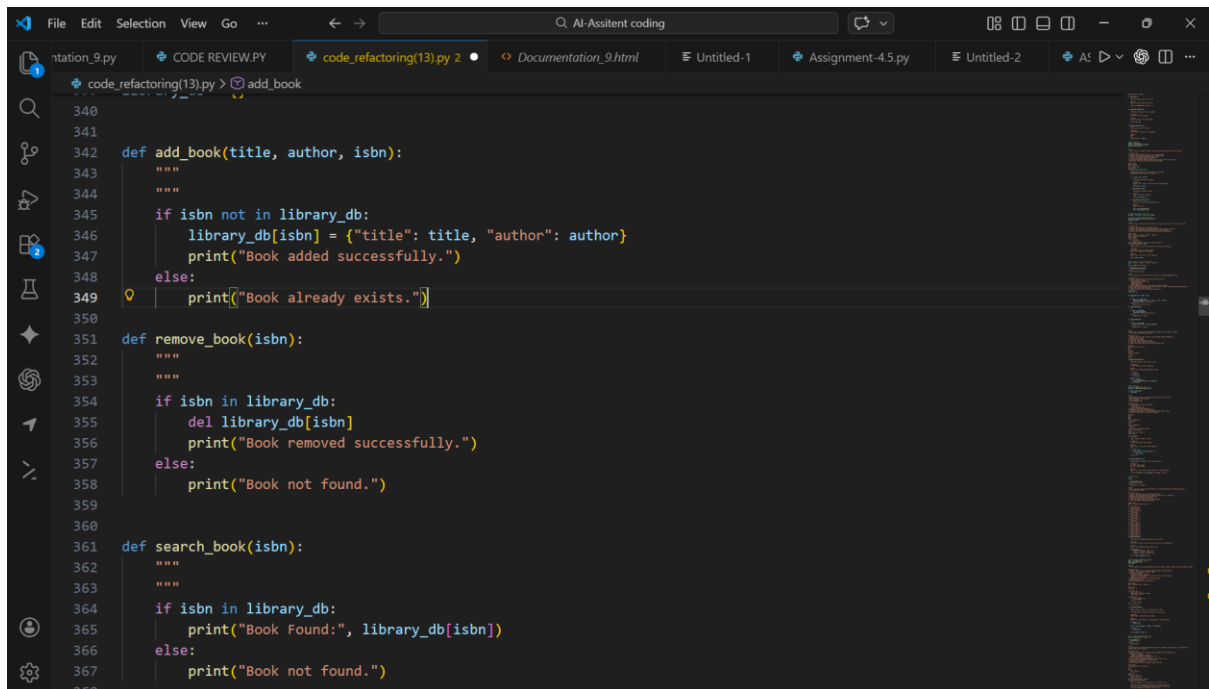
### PROMPT:

""You are given an unstructured Python script for a Library Management System.

Your task is to:

1. Refactor the code into a proper module named library.py.
2. Create reusable functions:
  - add\_book(title, author, isbn)
  - remove\_book(isbn)
  - search\_book(isbn)
3. Remove repeated conditional logic and use functions instead.
4. Add triple-quoted docstrings under each function so Copilot can auto-generate documentation.
5. Ensure the logic remains the same.
6. Prepare the module for documentation generation."""

## CODE:



```
340
341
342 def add_book(title, author, isbn):
343     """
344     """
345     if isbn not in library_db:
346         library_db[isbn] = {"title": title, "author": author}
347         print("Book added successfully.")
348     else:
349         print("Book already exists.")
350
351 def remove_book(isbn):
352     """
353     """
354     if isbn in library_db:
355         del library_db[isbn]
356         print("Book removed successfully.")
357     else:
358         print("Book not found.")
359
360
361 def search_book(isbn):
362     """
363     """
364     if isbn in library_db:
365         print("Book Found:", library_db[isbn])
366     else:
367         print("Book not found.")
368
```

## OBSERVATION:

Repeated library operations are converted into reusable functions.

Modular design improves maintainability and clarity.

Documentation makes functions easier to understand and use.

## TASK-8

### PROMPT:

""""You are given a poorly written Fibonacci program that uses global variables,

no functions, and inefficient structure.

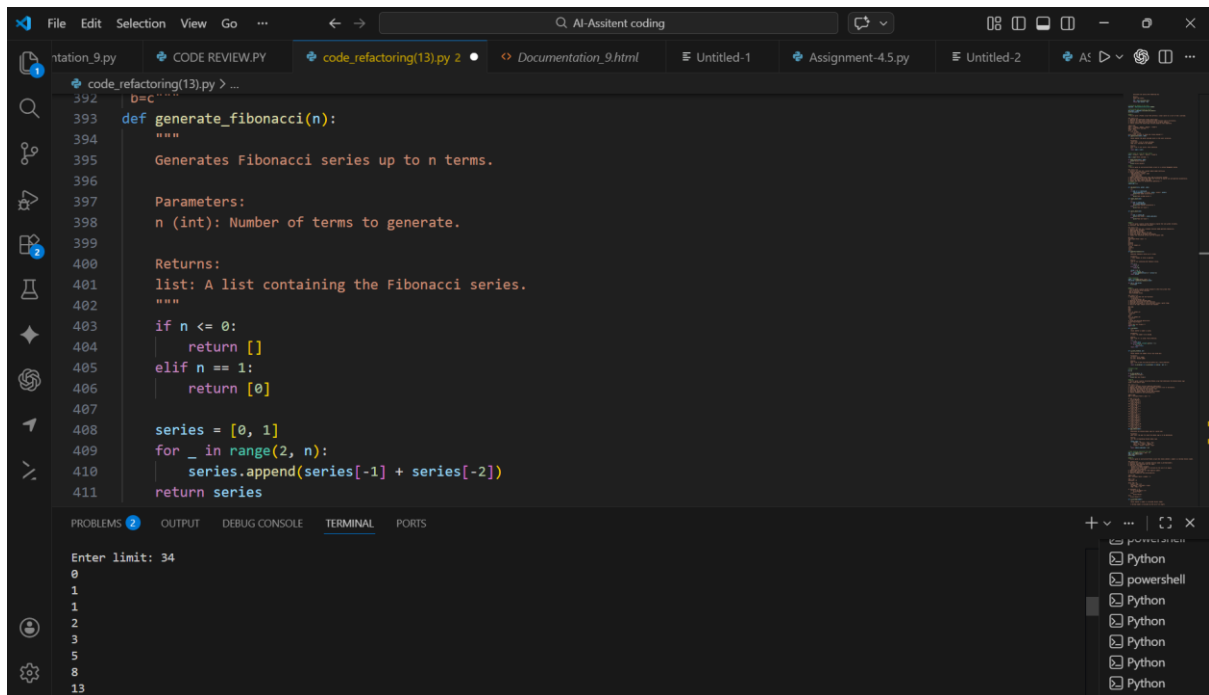
Your task is to:

1. Refactor the code into a reusable function named `generate_fibonacci(n)`.
2. Remove global variables.
3. Add proper docstrings.
4. Ensure the output remains the same.
5. Write test cases to validate the function.
6. Compare the refactored version with the original code.

Bad Code:

```
n=int(input("Enter limit: "))  
  
a=0  
  
b=1  
  
print(a)  
print(b)  
  
for i in range(2,n):  
  
    c=a+b  
  
    print(c)  
  
    a=b  
  
    b=c
```

## CODE:



The screenshot shows a code editor with a dark theme. The main editor window displays a Python function `generate_fibonacci(n)` with docstrings and logic. The function generates a Fibonacci series up to `n` terms. The docstring includes a description, parameters, and returns. The logic handles edge cases for `n <= 0` and `n == 1`, and then iterates from 2 to `n` to build the series. The bottom panel shows the terminal output for `Enter limit: 34`, displaying the first 13 terms of the Fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13.

```
392 d=c""...
393 def generate_fibonacci(n):
394     """
395     Generates Fibonacci series up to n terms.
396
397     Parameters:
398     n (int): Number of terms to generate.
399
400     Returns:
401     list: A list containing the Fibonacci series.
402     """
403     if n <= 0:
404         return []
405     elif n == 1:
406         return [0]
407
408     series = [0, 1]
409     for _ in range(2, n):
410         series.append(series[-1] + series[-2])
411     return series
```

Enter limit: 34  
0  
1  
1  
2  
3  
5  
8  
13

## OBSERVATION:

Global variables are removed and the logic is encapsulated inside a function, which improves modularity and reusability.

The refactored version is easier to test because input and output are separated from the computation logic.

## TASK-9

### PROMPT:

""You are given a poorly written program to check twin primes that:

- Uses inefficient prime checking.
- Has no functions.
- Uses hardcoded values.

Your task is to:

1. Refactor the code into two functions:
  - is\_prime(n)
  - is\_twin\_prime(p1, p2)
2. Optimize the prime-checking logic.
3. Add proper docstrings for both functions.
4. Generate and display all twin prime pairs within a given range.
5. Ensure the logic remains correct and reusable.

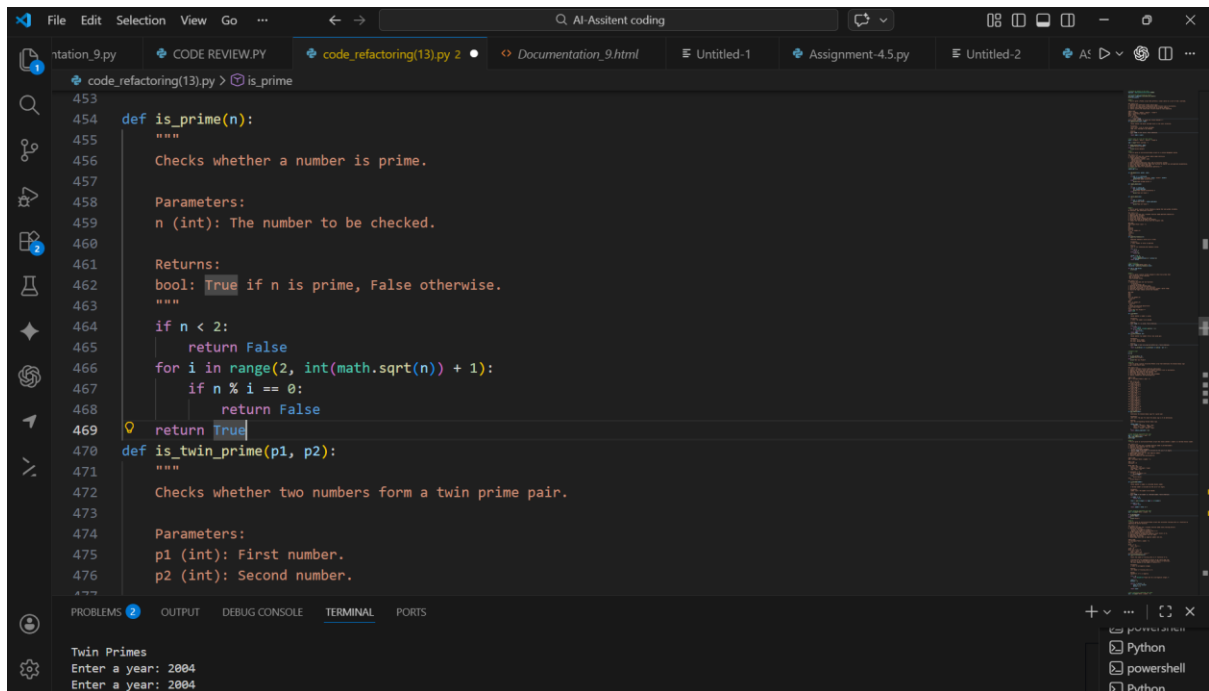
Bad Code:

```
a=11
b=13
fa=0
for i in range(2,a):
    if a%i==0:
        fa=1
fb=0
for i in range(2,b):
    if b%i==0:
        fb=1
if fa==0 and fb==0 and abs(a-b)==2:
    print("Twin Primes")
```

else:

```
print("Not Twin Primes")
```

CODE:



The screenshot shows a code editor with a dark theme. The main editor window displays a Python file named `code_refactoring(13).py`. The code defines two functions: `is_prime(n)` and `is_twin_prime(p1, p2)`. The `is_prime` function includes a docstring, parameters, and returns a boolean. It uses a loop to check for divisibility up to the square root of `n`. The `is_twin_prime` function also has a docstring and parameters. Below the code, there is a terminal window showing the output of the program. The terminal displays the text "Twin Primes" followed by two prompts "Enter a year: 2004" and "Enter a year: 2004".

```
453
454 def is_prime(n):
455     """
456     Checks whether a number is prime.
457
458     Parameters:
459     n (int): The number to be checked.
460
461     Returns:
462     bool: True if n is prime, False otherwise.
463     """
464     if n < 2:
465         return False
466     for i in range(2, int(math.sqrt(n)) + 1):
467         if n % i == 0:
468             return False
469     return True
470
471 def is_twin_prime(p1, p2):
472     """
473     Checks whether two numbers form a twin prime pair.
474
475     Parameters:
476     p1 (int): First number.
477     p2 (int): Second number.
478
479     Returns:
480     bool: True if (p1, p2) is a twin prime pair, False otherwise.
481     """
482     return is_prime(p1) and is_prime(p2) and abs(p1 - p2) == 2
483
484 if __name__ == '__main__':
485     year1 = int(input("Enter a year: "))
486     year2 = int(input("Enter a year: "))
487     if is_twin_prime(year1, year2):
488         print("Twin Primes")
489     else:
490         print("Not Twin Primes")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Twin Primes  
Enter a year: 2004  
Enter a year: 2004

OBSERVATION:

The prime-checking logic is moved into a reusable function, which eliminates hardcoded values and repeated code. Efficiency improves by optimizing the prime check instead of testing all numbers blindly. Code becomes modular, readable, and easier to test for different inputs while keeping the same logical behavior.



## TASK-10

### PROMPT:

""You are given a poorly structured Python script that determines the Chinese Zodiac sign using a long if–elif chain.

Your task is to:

1. Create a reusable function named `get_zodiac(year)`.
2. Replace the if–elif chain with a cleaner structure (list or dictionary).
3. Separate input handling from business logic.
4. Add proper docstrings to the function.
5. Ensure the output remains correct and unchanged.
6. Improve readability and maintainability.

### Legacy Code:

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

```
if year % 12 == 0:
```

```
    print("Monkey")
```

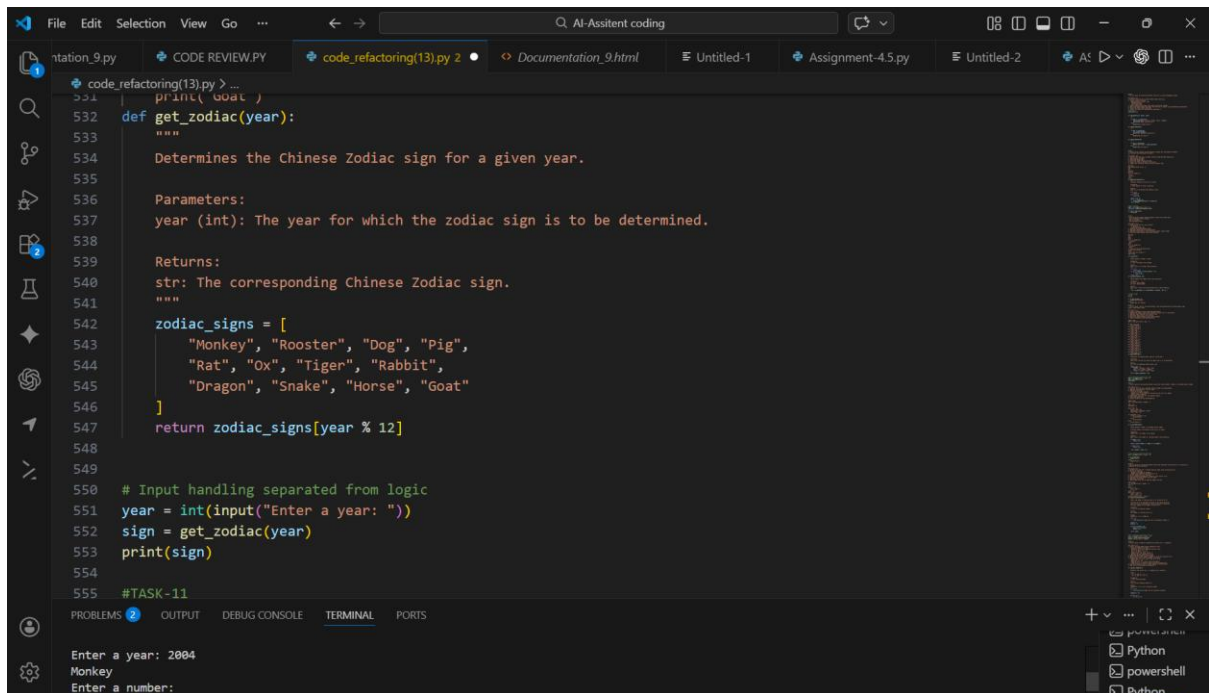
```
elif year % 12 == 1:
```

```
    print("Rooster")
```

```
elif year % 12 == 2:
```

```
    print("Dog")
elif year % 12 == 3:
    print("Pig")
elif year % 12 == 4:
    print("Rat")
elif year % 12 == 5:
    print("Ox")
elif year % 12 == 6:
    print("Tiger")
elif year % 12 == 7:
    print("Rabbit")
elif year % 12 == 8:
    print("Dragon")
elif year % 12 == 9:
    print("Snake")
elif year % 12 == 10:
    print("Horse")
elif year % 12 == 11:
    print("Goat")"""
```

## CODE:



```
531 print(Goat)
532 def get_zodiac(year):
533     """
534     Determines the Chinese Zodiac sign for a given year.
535
536     Parameters:
537     year (int): The year for which the zodiac sign is to be determined.
538
539     Returns:
540     str: The corresponding Chinese Zodiac sign.
541     """
542     zodiac_signs = [
543         "Monkey", "Rooster", "Dog", "Pig",
544         "Rat", "Ox", "Tiger", "Rabbit",
545         "Dragon", "Snake", "Horse", "Goat"
546     ]
547     return zodiac_signs[year % 12]
548
549
550 # Input handling separated from logic
551 year = int(input("Enter a year: "))
552 sign = get_zodiac(year)
553 print(sign)
554
555 #TASK-11
```

Enter a year: 2004  
Monkey  
Enter a number:

## OBSERVATION:

The long if–elif chain is replaced with a cleaner data structure (list or dictionary), which simplifies the logic and reduces redundancy. Separating input handling from the zodiac calculation function improves modularity and makes the logic reusable and testable.

## TASK-11

### PROMPT:

""""You are given an unstructured Python script that checks whether a number is a Harshad (Niven) number.

Your task is to:

1. Refactor the code into a reusable function named `is_harshad(number)`.
2. Separate input handling from core logic.
3. Ensure the function:
  - Accepts an integer parameter.
  - Returns True if the number is divisible by the sum of its digits.
  - Returns False otherwise.
4. Handle edge cases such as 0 and negative numbers.
5. Add proper docstrings.
6. Improve readability and maintainability.

Legacy Code:

```
num = int(input("Enter a number: "))
```

```
temp = num
```

```
sum_digits = 0
```

```
while temp > 0:
```

```
    digit = temp % 10
```

```
    sum_digits = sum_digits + digit
```

```
    temp = temp // 10
```

```
if sum_digits != 0:
```

```
if num % sum_digits == 0:
```

```
    print("True")
```

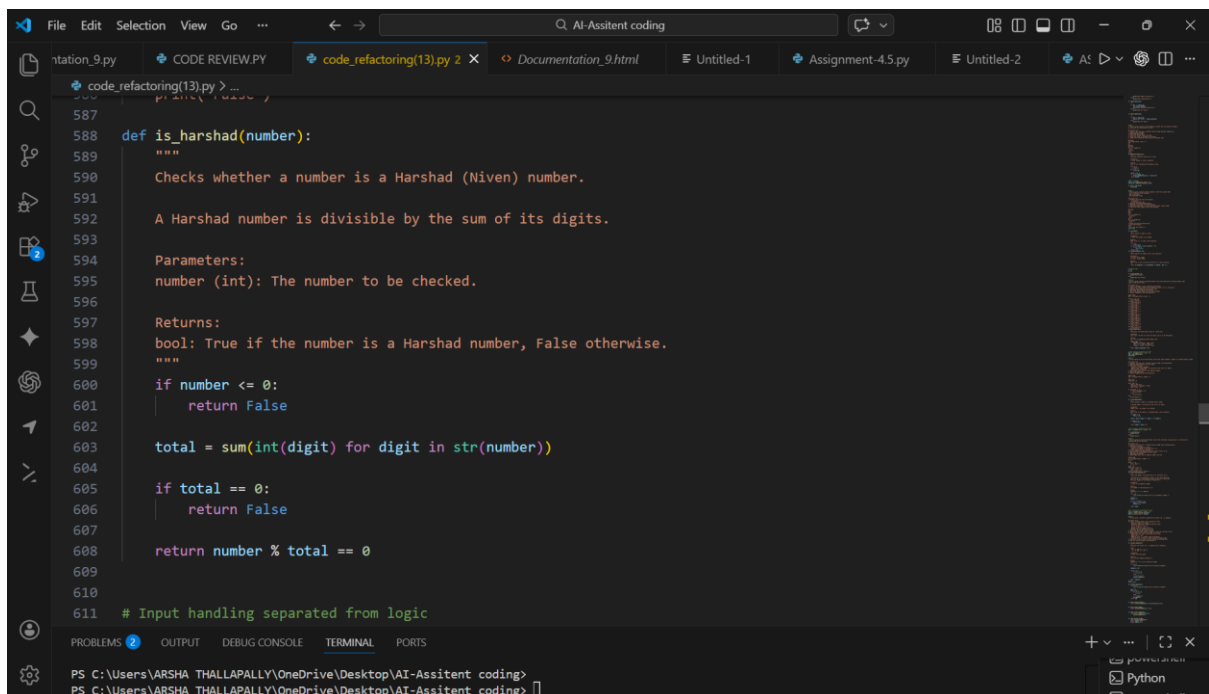
```
else:
```

```
    print("False")
```

```
else:
```

```
    print("False")"""
```

CODE:



```
587
588 def is_harshad(number):
589     """
590     Checks whether a number is a Harshad (Niven) number.
591
592     A Harshad number is divisible by the sum of its digits.
593
594     Parameters:
595     number (int): The number to be checked.
596
597     Returns:
598     bool: True if the number is a Harshad number, False otherwise.
599     """
600     if number <= 0:
601         return False
602
603     total = sum(int(digit) for digit in str(number))
604
605     if total == 0:
606         return False
607
608     return number % total == 0
609
610
611 # Input handling separated from logic
```

OBSERVATION:

The digit-sum and divisibility logic is moved into a reusable function, which removes redundancy and improves modularity. Separating input handling from computation makes the function easier to test and reuse in other programs.

## TASK-12

### PROMPT:

""You are given an unstructured Python script that calculates trailing zeros in a factorial by computing the entire factorial.

Your task is to:

1. Refactor the code into a reusable function named `count_trailing_zeros(n)`.
2. Ensure the function:
  - Accepts a non-negative integer `n`.
  - Returns the number of trailing zeros in `n!`.
3. Do NOT compute the full factorial.
4. Use an optimized mathematical approach (count factors of 5).
5. Separate user input/output from core logic.
6. Add proper docstrings.
7. Handle edge cases such as negative numbers and zero.

### Legacy Code:

```
n = int(input("Enter a number: "))  
  
fact = 1  
  
i = 1  
  
while i <= n:
```

```

        fact = fact * i

        i = i + 1

count = 0

while fact % 10 == 0:

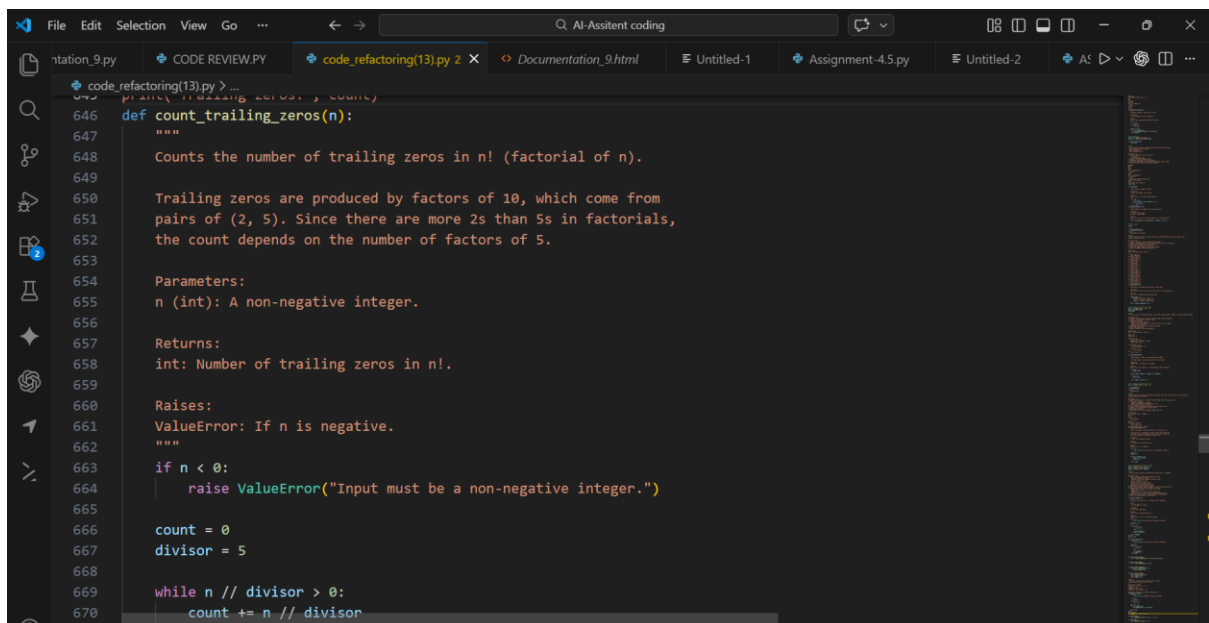
    count = count + 1

    fact = fact // 10

print("Trailing zeros:", count)"""

```

## CODE:



```

code_refactoring(13).py 2 x
Documentation_9.html
Untitled-1
Assignment-4.5.py
Untitled-2
AI-Assistent coding

code_refactoring(13).py > ...
646 def count_trailing_zeros(n):
647     """
648     Counts the number of trailing zeros in n! (factorial of n).
649
650     Trailing zeros are produced by factors of 10, which come from
651     pairs of (2, 5). Since there are more 2s than 5s in factorials,
652     the count depends on the number of factors of 5.
653
654     Parameters:
655     n (int): A non-negative integer.
656
657     Returns:
658     int: Number of trailing zeros in n!.
659
660     Raises:
661     ValueError: If n is negative.
662     """
663     if n < 0:
664         raise ValueError("Input must be a non-negative integer.")
665
666     count = 0
667     divisor = 5
668
669     while n // divisor > 0:
670         count += n // divisor

```

## OBSERVATION:

The inefficient full factorial computation is replaced with an optimized mathematical approach using powers of 5, which greatly improves performance.

Core logic is encapsulated inside a reusable function, making the code modular and easier to test.

Readability and maintainability improve while ensuring the output remains correct and unchanged.

## TASK-13

PROMPT:

""You are given a problem to generate the Collatz ( $3n + 1$ ) sequence.

Your task is to:

1. Write a function named `collatz_sequence(n)` that:
  - Takes an integer  $n$  as input.
  - Generates the Collatz sequence using the rules:
    - If  $n$  is even  $\rightarrow n = n / 2$
    - If  $n$  is odd  $\rightarrow n = 3n + 1$
  - Repeats until the value reaches 1.
  - Returns the full sequence as a list.
2. Add proper docstrings to the function.
3. Handle invalid input (negative numbers or zero) by raising an error.
4. Design pytest test cases to validate correctness:
  - Normal case:  $6 \rightarrow [6, 3, 10, 5, 16, 8, 4, 2, 1]$
  - Edge case:  $1 \rightarrow [1]$

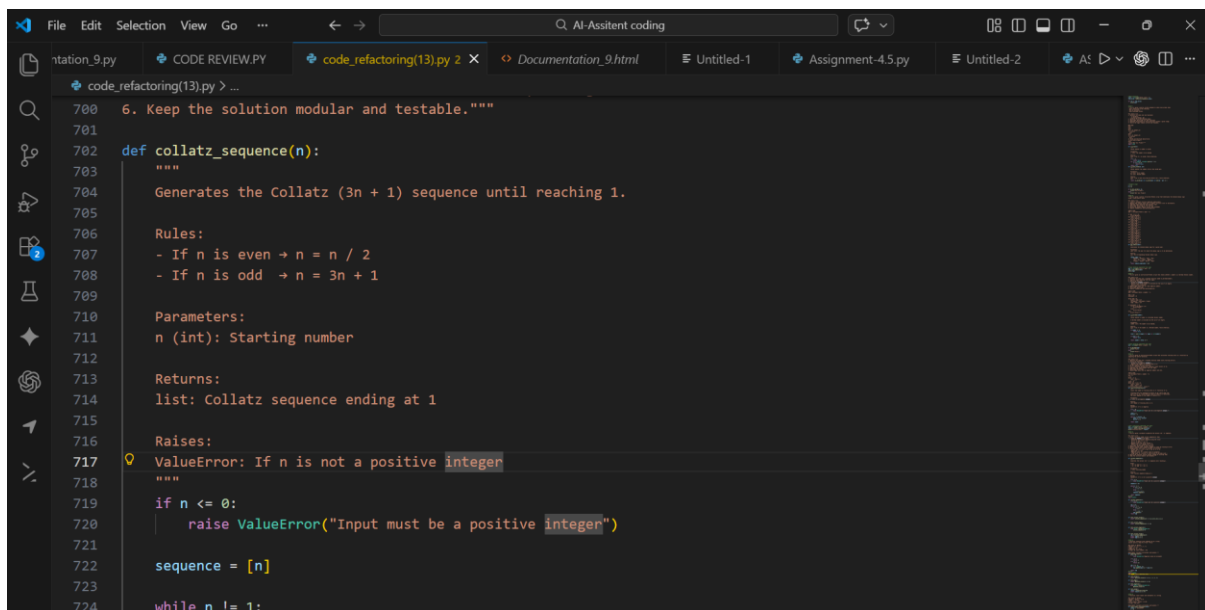


- Negative case: -5 → should raise an exception
- Large case: 27 → verify it starts with 27 and ends with 1

5. Ensure the function returns values instead of printing them.

6. Keep the solution modular and testable."""

CODE:



```
700 6. Keep the solution modular and testable."""
701
702 def collatz_sequence(n):
703     """
704     Generates the Collatz (3n + 1) sequence until reaching 1.
705
706     Rules:
707     - If n is even → n = n / 2
708     - If n is odd → n = 3n + 1
709
710     Parameters:
711     n (int): Starting number
712
713     Returns:
714     list: Collatz sequence ending at 1
715
716     Raises:
717     ValueError: If n is not a positive integer
718     """
719     if n <= 0:
720         raise ValueError("Input must be a positive integer")
721
722     sequence = [n]
723
724     while n != 1:
```

OBSERVATION:

The sequence generation logic is encapsulated inside a reusable function, which removes dependency on inline or procedural code.

Input validation improves reliability by handling negative and invalid values explicitly.

## TASK-14

### PROMPT:

"""Function: Generate Lucas sequence up to n terms.

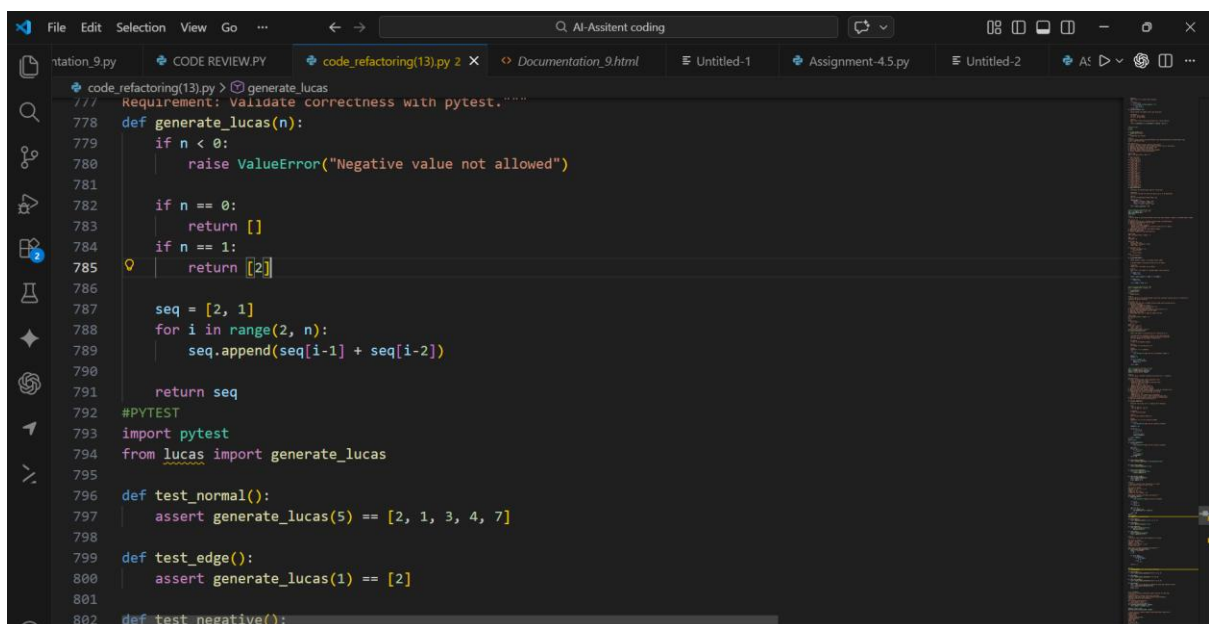
(Starts with 2,1 then  $F_n = F_{n-1} + F_{n-2}$ )

### Test Cases to Design:

- Normal: 5  $\rightarrow$  [2, 1, 3, 4, 7]
- Edge: 1  $\rightarrow$  [2]
- Negative: -5  $\rightarrow$  Error
- Large: 10 (last element = 76)

Requirement: Validate correctness with pytest."""

### CODE:



```
File Edit Selection View Go ... AI-Assistent coding
code_refactoring(13).py > generate_lucas
/// Requirement: Validate correctness with pytest."""
778 def generate_lucas(n):
779     if n < 0:
780         raise ValueError("Negative value not allowed")
781
782     if n == 0:
783         return []
784     if n == 1:
785         return [2]
786
787     seq = [2, 1]
788     for i in range(2, n):
789         seq.append(seq[i-1] + seq[i-2])
790
791     return seq
792
793 #PYTEST
794 import pytest
795 from lucas import generate_lucas
796
797 def test_normal():
798     assert generate_lucas(5) == [2, 1, 3, 4, 7]
799
800 def test_edge():
801     assert generate_lucas(1) == [2]
802
803 def test_negative():
```

### OBSERVATION:

The sequence generation logic is moved into a reusable function, which improves modularity and avoids repeated code.

Edge and negative input cases are handled explicitly, increasing reliability and robustness of the program.

## TASK-15

PROMPT:

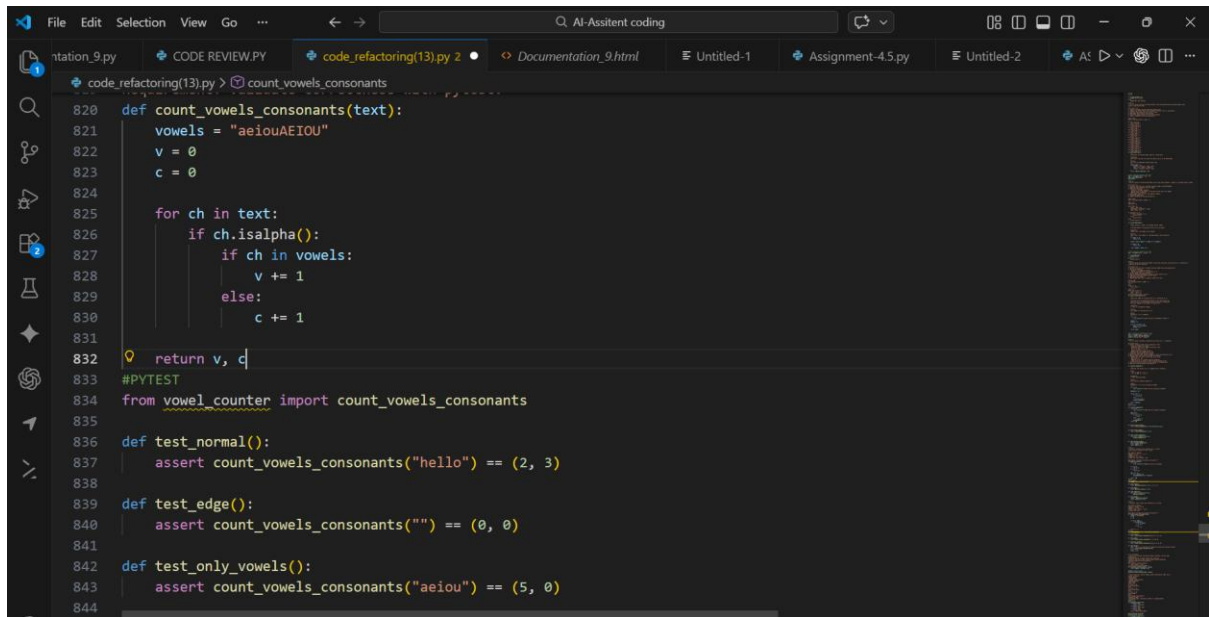
Function: Count vowels and consonants in a string.

Test Cases to Design:

- Normal: "hello" → (2,3)
- Edge: "" → (0,0)
- Only vowels: "aeiou" → (5,0)
- Large: Long text

Requirement: Validate correctness with pytest."""

## CODE:

A screenshot of a code editor window with a dark theme. The editor shows a Python file named 'code\_refactoring(13).py'. The code defines a function 'count\_vowels\_consonants(text)' that iterates through each character in the text, checks if it's a vowel (using a string 'aeiouAEIOU'), and increments a vowel counter 'v' or a consonant counter 'c'. Below the function, there are three test functions: 'test\_normal()' which asserts that 'hello' has 2 vowels and 3 consonants; 'test\_edge()' which asserts that an empty string has 0 vowels and 0 consonants; and 'test\_only\_vowels()' which asserts that 'aeiou' has 5 vowels and 0 consonants. The editor's interface includes a sidebar on the left with icons for Explorer, Search, Run and Debug, and Test Explorer. The top bar shows the file name and a search bar. The bottom right corner shows a vertical scrollbar.

```
820 def count_vowels_consonants(text):
821     vowels = "aeiouAEIOU"
822     v = 0
823     c = 0
824
825     for ch in text:
826         if ch.isalpha():
827             if ch in vowels:
828                 v += 1
829             else:
830                 c += 1
831
832     return v, c
833
834 #PYTEST
835 from vowel_counter import count_vowels_consonants
836
837 def test_normal():
838     assert count_vowels_consonants("hello") == (2, 3)
839
840 def test_edge():
841     assert count_vowels_consonants("") == (0, 0)
842
843 def test_only_vowels():
844     assert count_vowels_consonants("aeiou") == (5, 0)
```

## OBSERVATION:

String processing logic is encapsulated inside a reusable function, improving modularity and separation of concerns.

Edge cases such as empty strings and all-vowel inputs are handled correctly, increasing robustness.

Test cases ensure accurate counting of vowels and consonants while preserving the expected behavior.