AI ASSISTED CODING

LAB-13.1

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Task Description #1 (Refactoring – Removing Code Duplication)

- **Task: Use AI to refactor a given Python script that contains multiple repeated code blocks.**
- **Instructions:**

o Prompt AI to identify duplicate logic and replace it with functions or classes.

o Ensure the refactored code maintains the same output. o Add docstrings to all functions.

- **Sample Legacy Code:**

```
# Legacy script with repeated logic 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))
```

- **Expected Output:**

o Refactored code with a reusable function and no duplication.

PROMPT:

#Identify duplicate logic and replace it with functions or classes, make sure the refactored code maintains the same output.

GIVEN CODE AND OUTPUT:

```python
#Identify duplicate logic and replace it with functions or classes, make sure the refactored code mainta
def calculate_rectangle_area(length, width):
    """Calculate the area of a rectangle given its length and width.
    input: length and width of the rectangle
    output: area of the rectangle"""
    return length * width

def calculate_rectangle_perimeter(length, width):
    """Calculate the perimeter of a rectangle given its length and width.
    input: length and width of the rectangle
    output: perimeter of the rectangle"""
    return 2 * (length + width)

print("Area of Rectangle:", calculate_rectangle_area(5, 10))
print("Perimeter of Rectangle:", calculate_rectangle_perimeter(5, 10))
print("Area of Rectangle:", calculate_rectangle_area(7, 12))
print("Perimeter of Rectangle:", calculate_rectangle_perimeter(7, 12))
print("Area of Rectangle:", calculate_rectangle_area(10, 15))
print("Perimeter of Rectangle:", calculate_rectangle_perimeter(10, 15))
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS  POSTMAN CONSOLE

PS C:\Users\katta\OneDrive\Desktop\AIAC> & C:/Users/katta/anaconda3/python.exe c:/Users/katta/OneDrive/Desktop/AIAC/la
Area of Rectangle: 50
Perimeter of Rectangle: 30
Area of Rectangle: 84
Perimeter of Rectangle: 38
Area of Rectangle: 150
Perimeter of Rectangle: 50
```

Task Description #2 (Refactoring – Optimizing Loops and Conditionals)

- **Task: Use AI to analyze a Python script with nested loops and complex conditionals.**
- **Instructions: o Ask AI to suggest algorithmic improvements (e.g., replace nested loops with set lookups or comprehensions). o Implement changes while keeping logic intact. o Compare execution time before and after refactoring.**
- **Sample Legacy Code: # Legacy inefficient code names = ["Alice", "Bob", "Charlie", "David"] search_names = ["Charlie", "Eve", "Bob"] for s in search_names:**

found = False for

n in names: if s

== n:

found = True

if found:

print(f"{s} is in the list") else:

print(f"{s} is not in the list")

- **Expected Output:**

o Optimized code using set lookups with performance comparison

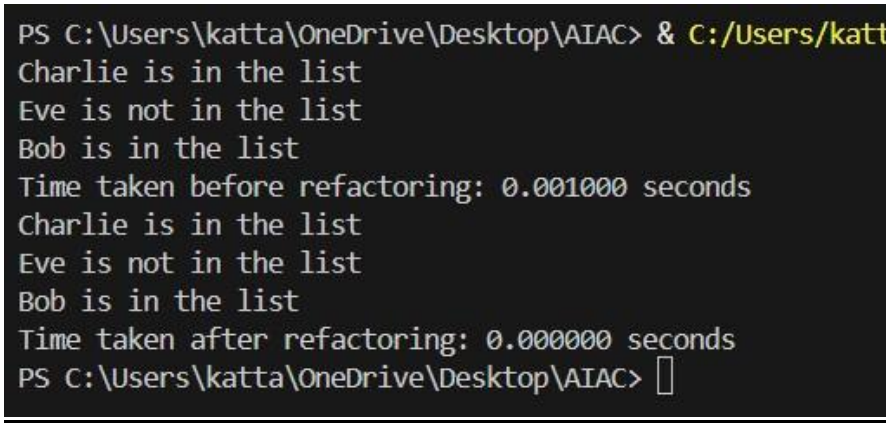
table.

PROMPT:

#Refactor this Python code to optimize nested loops: replace inner loops with set lookups or comprehensions while keeping the logic identical. Include a simple timing comparison before and after refactoring.

GIVEN CODE AND OUTPUT:

```
#Refactor this Python code to optimize nested loops: replace inner loops with set lookups or compr
"""names = ["Alice", "Bob", "Charlie", "David"]
search_names = ["Charlie", "Eve", "Bob"]
for s in search_names:
    found = False
    for n in names:
        if s == n:
            found = True
            break
    if found:
        print(f"{s} is in the list")
else:
    print(f"{s} is not in the list")"""
import time
names = ["Alice", "Bob", "Charlie", "David"]
search_names = ["Charlie", "Eve", "Bob"]
# Timing before refactoring
start_time = time.time()
for s in search_names:
    found = False
    for n in names:
        if s == n:
            found = True
            break
    if found:
        print(f"{s} is in the list")
    else:
        print(f"{s} is not in the list")
end_time = time.time()
print(f"Time taken before refactoring: {end_time - start_time:.6f} seconds")
# Refactored code using set lookups
start_time = time.time()
names_set = set(names)  # Convert list to set for O(1) lookups
for s in search_names:
    if s in names_set:
        print(f"{s} is in the list")
    else:
        print(f"{s} is not in the list")
end_time = time.time()
print(f"Time taken after refactoring: {end_time - start_time:.6f} seconds")
```



Task Description #3 (Refactoring – Extracting Reusable Functions)

- **Task: Use AI to refactor a legacy script where multiple calculations are embedded directly inside the main code block.**
- **Instructions:**

o Identify repeated or related logic and extract it into reusable functions. o Ensure the refactored code is modular, easy to read, and documented with docstrings.

- **Sample Legacy Code:**

 # Legacy script with inline repeated logic

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)

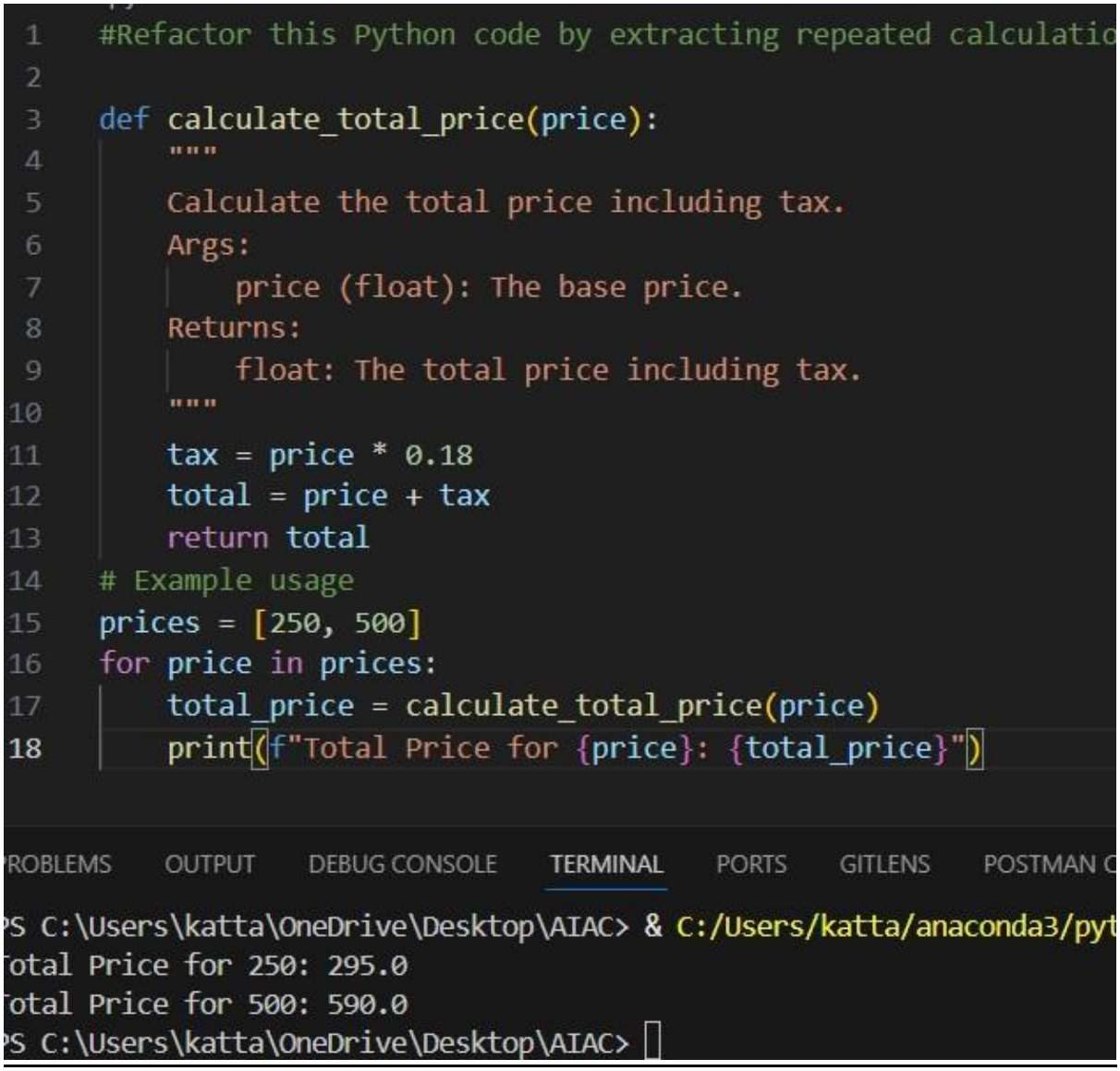
- **Expected Output:**

o Code with a function calculate_total(price) that can be reused for multiple price inputs.

PROMPT:

Refactor this Python code by extracting repeated calculations into a reusable function with docstrings. Make the code modular, readable, and allow multiple inputs without duplicating logic.

GIVEN CODE AND OUTPUT:



Task Description #4 (Refactoring – Replacing Hardcoded Values with Constants)

- **Task: Use AI to identify and replace all hardcoded "magic numbers" in the code with named constants.**
- **Instructions:**

o Create constants at the top of the file. o Replace all hardcoded occurrences in calculations with these constants. o Ensure the code remains functional and is easier to maintain.

- **Sample Legacy Code:**

 # Legacy script with hardcoded values print("Area of Circle:", 3.14159 * (7 ** 2))

print("Circumference of Circle:", 2 * 3.14159 * 7)

• **Expected Output: o Code with constants like PI = 3.14159 and RADIUS**

= 7 used in calculations.

PROMPT:

Refactor this Python code to replace all hardcoded “magic numbers” with named constants at the top of the file. Ensure calculations remain correct and the code is easier to maintain.

GIVEN CODE AND OUTPUT:

```
#Refactor this Python code to replace all hardcoded
PI = 3.14159
RADIUS = 7
print("Area of Circle:", PI * (RADIUS ** 2))
print("Circumference of Circle:", 2 * PI * RADIUS)
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS  P
PS C:\Users\katta\OneDrive\Desktop\AIAC> & C:/Users/katta/anacor
Area of Circle: 153.93791
Circumference of Circle: 43.98226
PS C:\Users\katta\OneDrive\Desktop\AIAC>
```

Task Description #5 (Refactoring – Improving Variable Naming and Readability)

• **Task: Use AI to improve readability by renaming unclear variables and adding inline comments.**

• **Instructions:**

o Replace vague names with meaningful ones.

o Add comments where logic is not obvious. o

Keep functionality exactly the same.

• **Sample Legacy Code:**

 # Legacy script with poor variable names

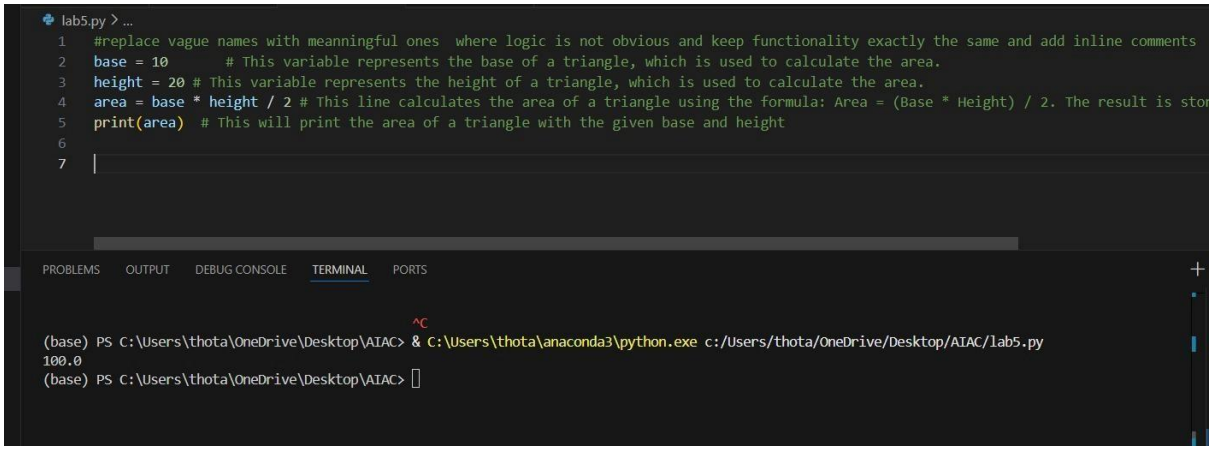
a = 10 b = 20 c = a * b / 2 print(c)

• **Expected Output: o Code with descriptive variable names like base, height, area_of_triangle, plus explanatory comments.**

PROMPT:

#replace vague names with meanningful ones where logic is not obvious and keep functionality exactly the same and add inline comments **GIVEN CODE AND**

OUTPUT:



Task Description #6 (Refactoring – Removing Redundant Conditional Logic) •

Task: Use AI to refactor a Python script that contains repeated if–else logic

for grading students.

• Instructions:

o Ask AI to identify redundant conditional checks.

o Replace them with a reusable function. o

Ensure grading logic remains unchanged.

• 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")

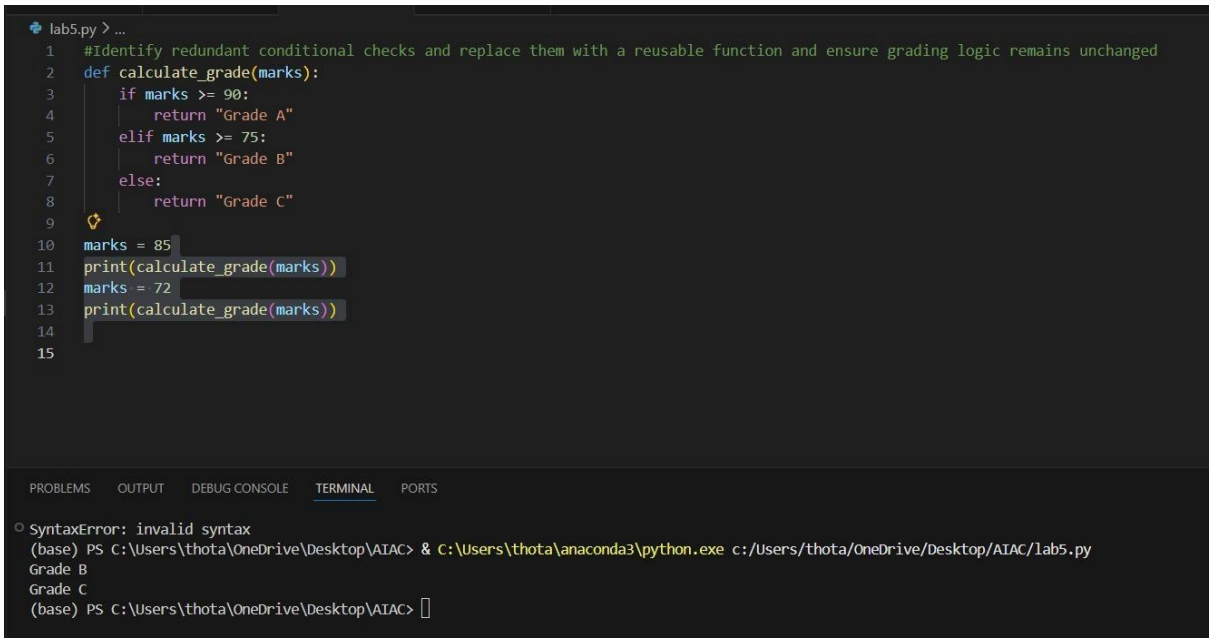
else:

print("Grade C") • Expected Output: o A reusable function like

calculate_grade(marks) with clean logic and docstring.

PROMPT:

#Identify redundant conditional checks and replace them with a reusable function and ensure grading logic remains unchanged **GIVEN CODE AND OUTPUT:**



Task Description #7 (Refactoring – Converting Procedural Code to Functions)

• Task: Use AI to refactor procedural input–processing logic into functions.

• Instructions:

o Identify input, processing, and output sections.

o Convert each into a separate function. o Improve code readability

without changing behavior.

• Sample Legacy Code: num = int(input("Enter number: "))

square = num * num

print("Square:", square)

• Expected Output:

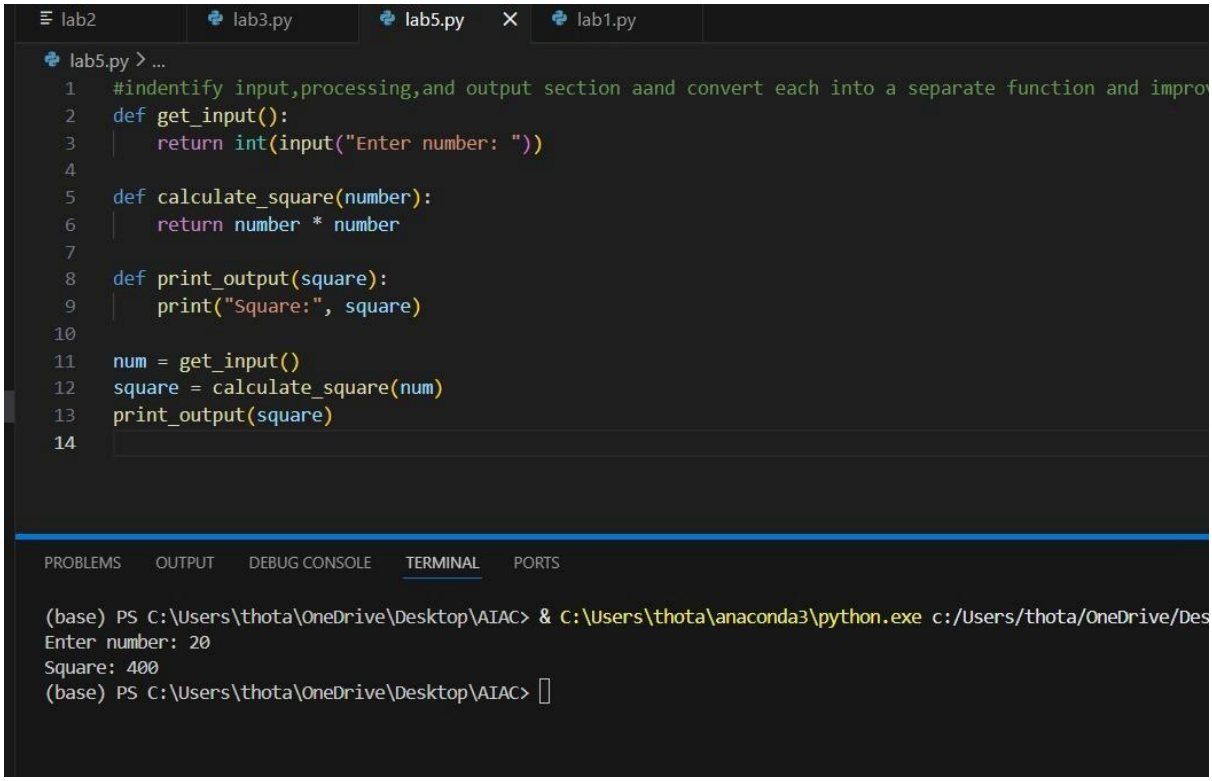
o Modular code using functions like get_input(), calculate_square(), and

display_result().

PROMPT:

#indentify input, processing, and output section and convert each into a separate function and improve code readability without changing behaviour.

GIVEN CODE AND OUTPUT:



Task Description #8 (Refactoring – Optimizing List Processing)

• Task: Use AI to refactor inefficient list processing logic.

• Instructions:

o Ask AI to replace manual loops with list comprehensions or built-in

functions. o Ensure output

remains identical.

• Sample Legacy Code: nums = [1, 2, 3, 4, 5] squares = [] for

n in nums: squares.append(n * n) print(squares) • Expected

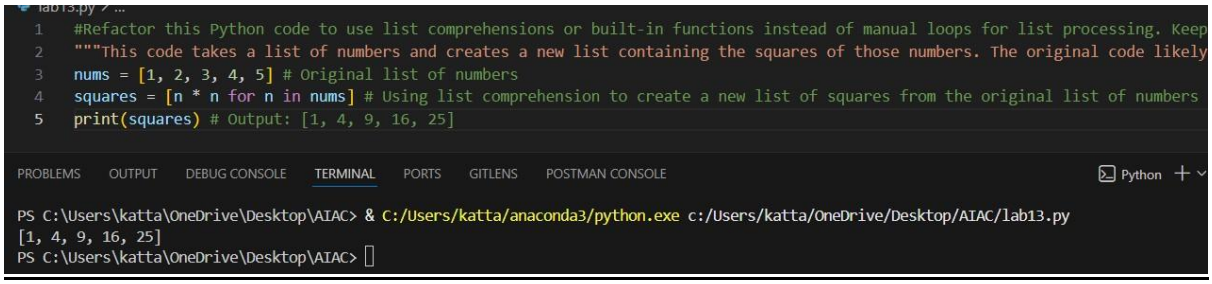
Output: o Optimized version using list comprehension with

improved readability

PROMPT:

Refactor this Python code to use list comprehensions or built-in functions instead of manual loops for list processing. Keep the output identical but make the code more concise and readable.

GIVEN CODE AND OUTPUT:



```
#Refactor this Python code to use list comprehensions or built-in functions instead of manual loops for list processing. Keep
"""This code takes a list of numbers and creates a new list containing the squares of those numbers. The original code likely
nums = [1, 2, 3, 4, 5] # Original list of numbers
squares = [n * n for n in nums] # Using list comprehension to create a new list of squares from the original list of numbers
print(squares) # Output: [1, 4, 9, 16, 25]
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS  POSTMAN CONSOLE        Python

PS C:\Users\katta\OneDrive\Desktop\AIAC> & C:/Users/katta/anaconda3/python.exe c:/Users/katta/OneDrive/Desktop/AIAC/lab13.py
[1, 4, 9, 16, 25]
PS C:\Users\katta\OneDrive\Desktop\AIAC>
```