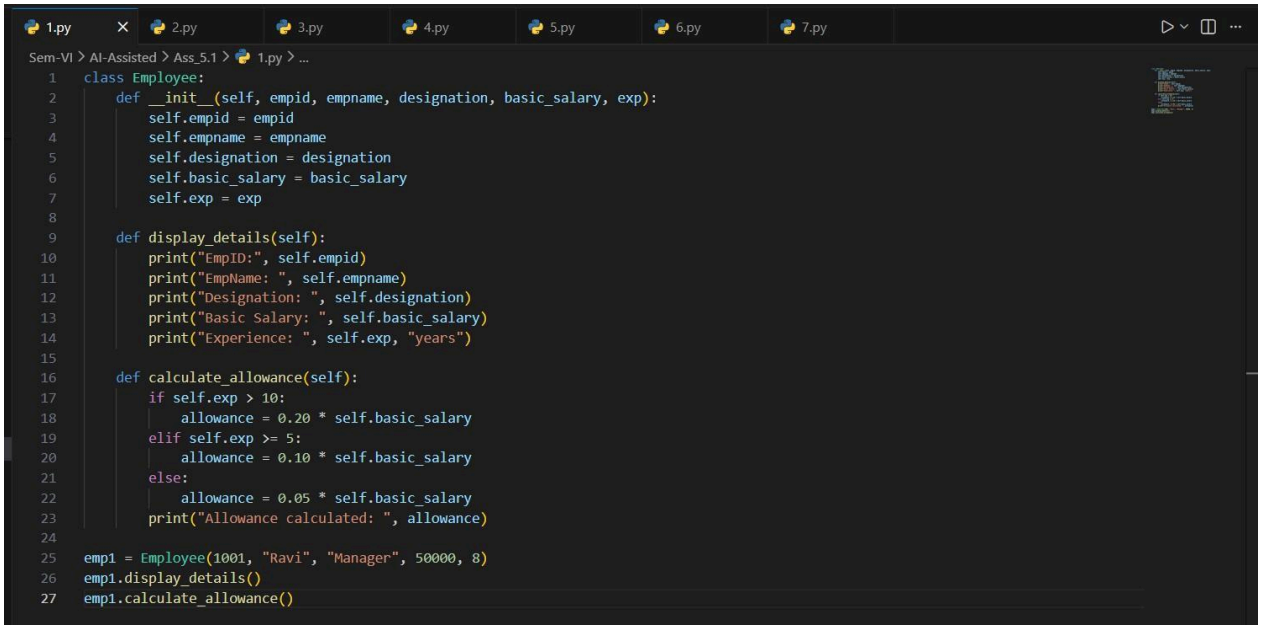
AI ASSISTED CODING Lab Assignment 5.1 and 6

Shivanand Rama
Hall ticket no:2303a51037
BATCH 01

Task 1:
Employee Data: Create Python code that defines a class named `Employee` with the following attributes: `empid`, `empname`, `designation`, `basic_salary`, and `exp`. Implement a method `display_details()` to print all employee details. Implement another method `calculate_allowance()` to determine additional allowance based on experience:

If `exp > 10 years` → allowance = 20% of `basic_salary`
If `5 ≤ exp ≤ 10 years` → allowance = 10% of `basic_salary`
If `exp < 5 years` → allowance = 5% of `basic_salary`

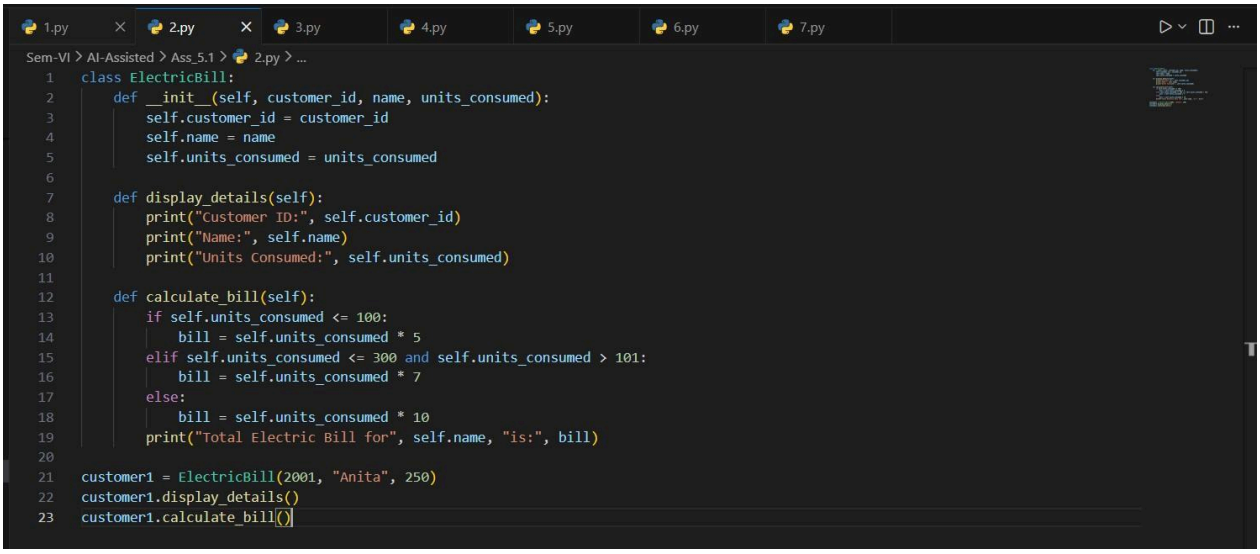
Finally, create at least one instance of the `Employee` class, call the `display_details()` method, and print the calculated allowance.



Task 2:
Electricity Bill Calculation- Create Python code that defines a class named `ElectricityBill` with attributes: `customer_id`, `name`, and `units_consumed`. Implement a method `display_details()` to print customer details, and a method `calculate_bill()` where:

Units ≤ 100 → ₹5 per unit
101 to 300 units → ₹7 per unit More
than 300 units → ₹10 per unit

Create a bill object, display details, and print the total bill amount.

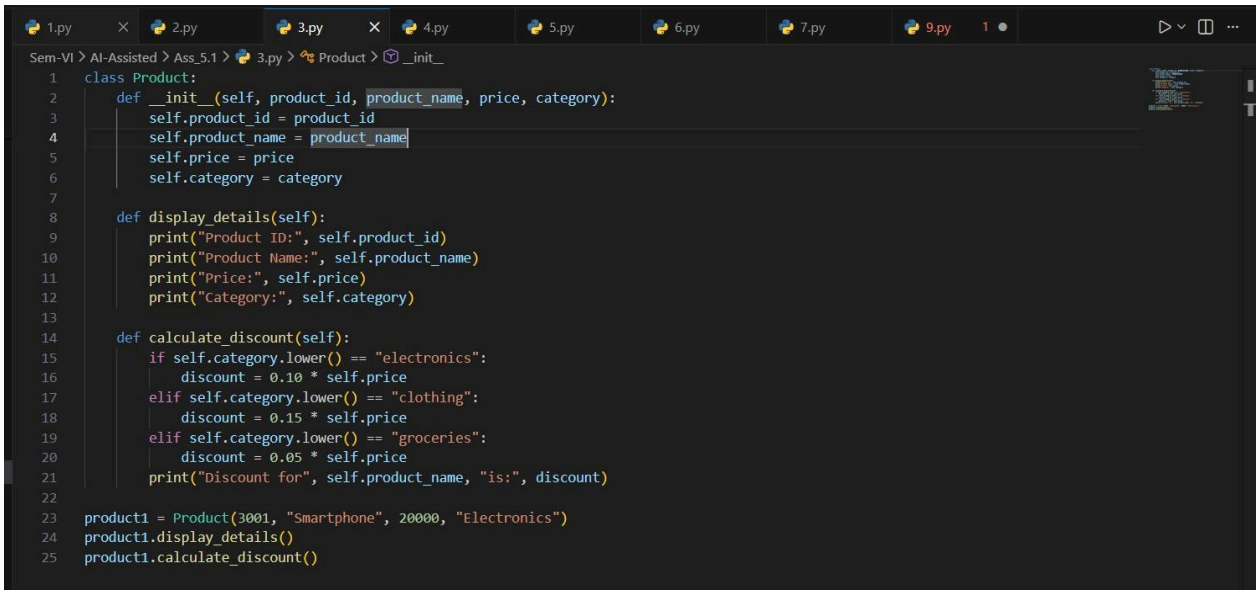


Task 3:

Product Discount Calculation- Create Python code that defines a class named `Product` with attributes: `product_id`, `product_name`, `price`, and `category`. Implement a method `display_details()` to print product details. Implement another method `calculate_discount()` where:

Electronics → 10% discount
Clothing → 15% discount
Grocery → 5% discount

Create at least one product object, display details, and print the final price after discount.



Task 4:

Book Late Fee Calculation- Create Python code that defines a class named `LibraryBook` with attributes: `book_id`, `title`, `author`, `borrower`, and `days_late`. Implement a method `display_details()` to print book details, and a method `calculate_late_fee()` where:

Days late ≤ 5 → ₹5 per day
6 to 10 days late → ₹7 per day
More than 10 days late → ₹10 per day

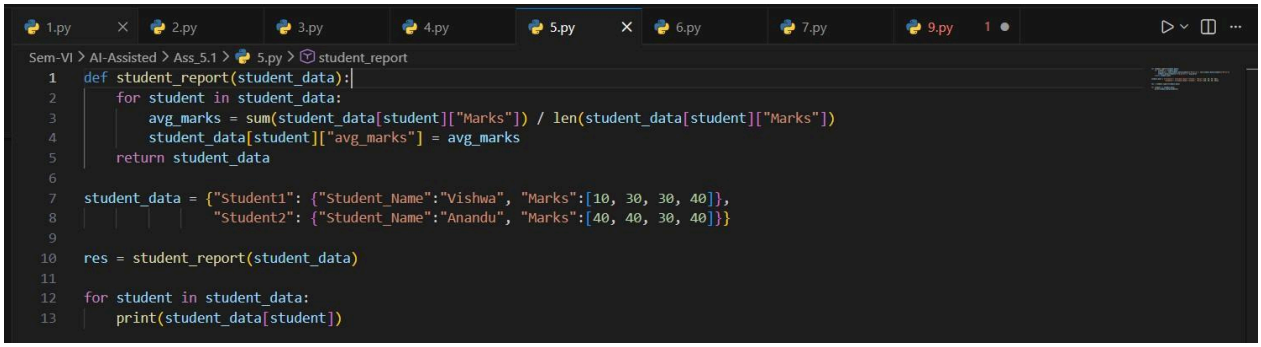
Create a book object, display details, and print the late fee.

Task 5:

Student Performance Report - Define a function `student_report(student_data)` that accepts a dictionary containing student names and their marks. The function should:

Calculate the average score for each student
Determine pass/fail status (pass ≥ 40)
Return a summary report as a list of dictionaries

Use Copilot suggestions as you build the function and format the output.

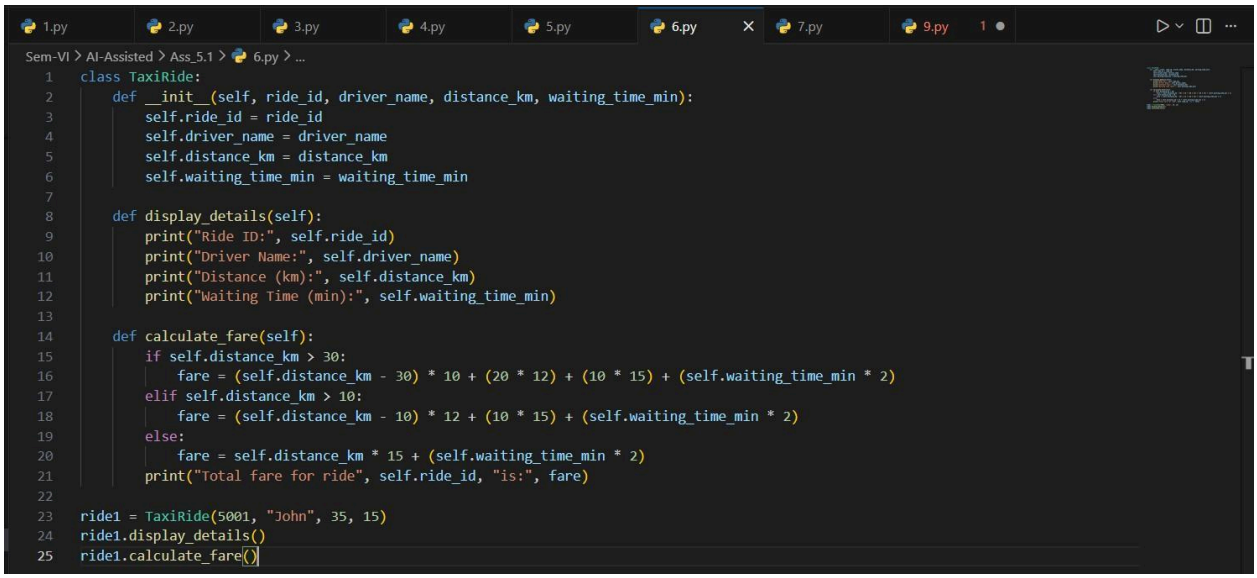


Task 6:

Taxi Fare Calculation-Create Python code that defines a class named `TaxiRide` with attributes: `ride_id`, `driver_name`, `distance_km`, and `waiting_time_min`. Implement a method `display_details()` to print ride details, and a method `calculate_fare()` where:

₹15 per km for the first 10 km
₹12 per km for the next 20 km
₹10 per km above 30 km Waiting
charge: ₹2 per minute

Create a ride object, display details, and print the total fare.

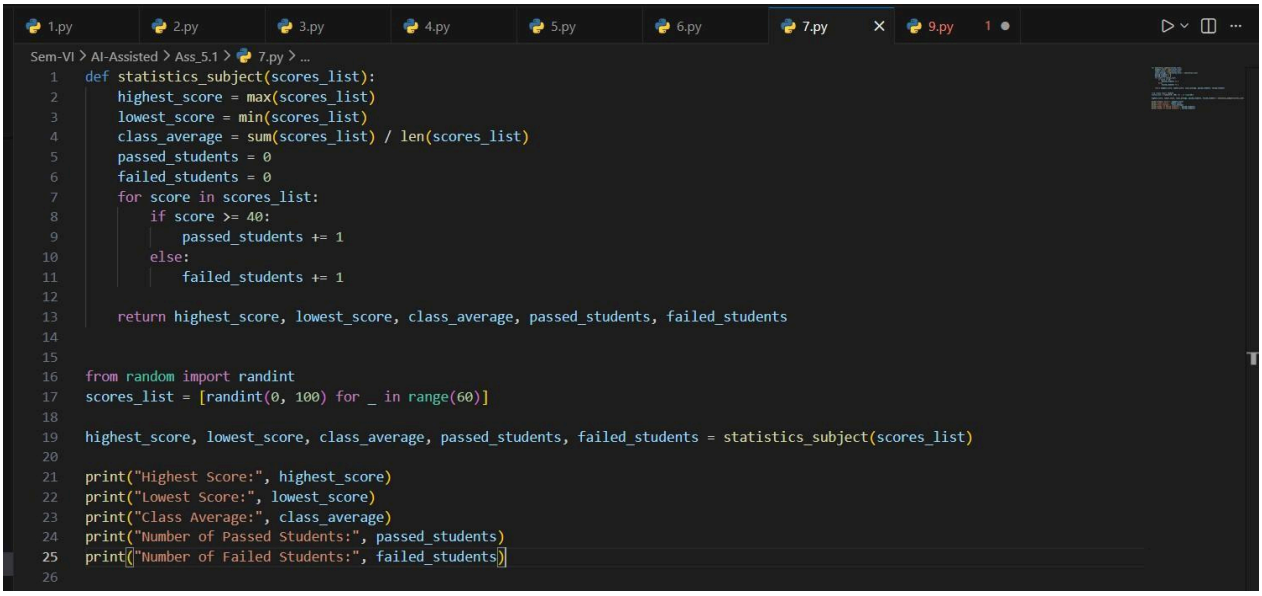


Task 7:

Statistics Subject Performance - Create a Python function `statistics_subject(scores_list)` that accepts a list of 60 student scores and computes key performance statistics. The function should return the following:

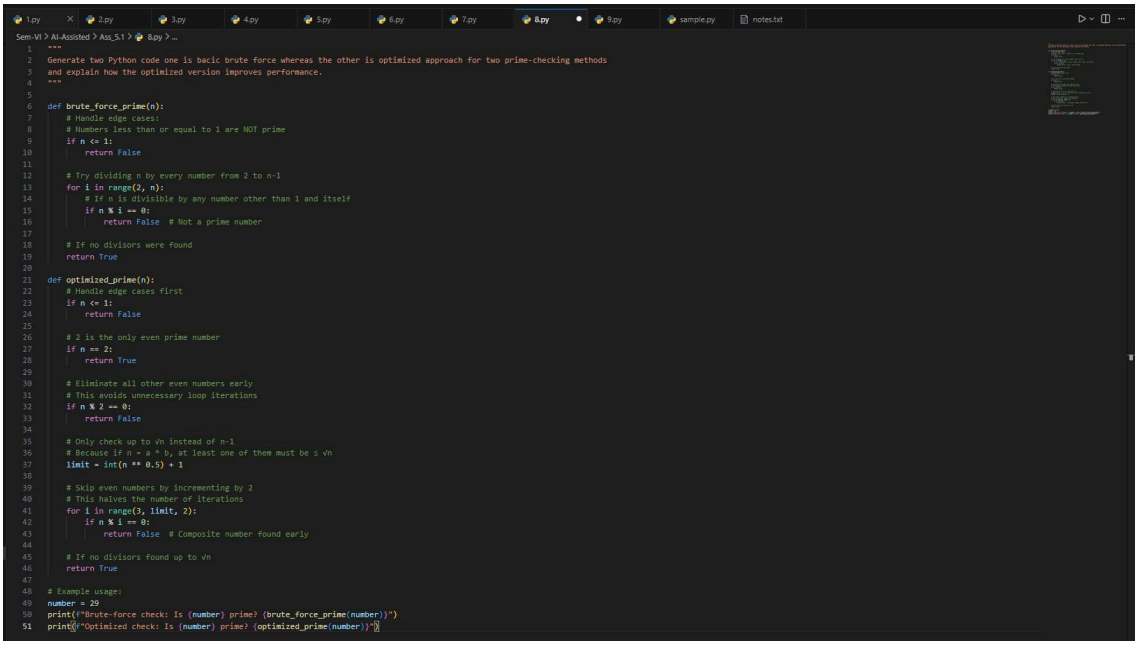
Highest score in the class
Lowest score in the class
Class average score
Number of students passed (score ≥ 40)
Number of students failed (score < 40)

Allow Copilot to assist with aggregations and logic



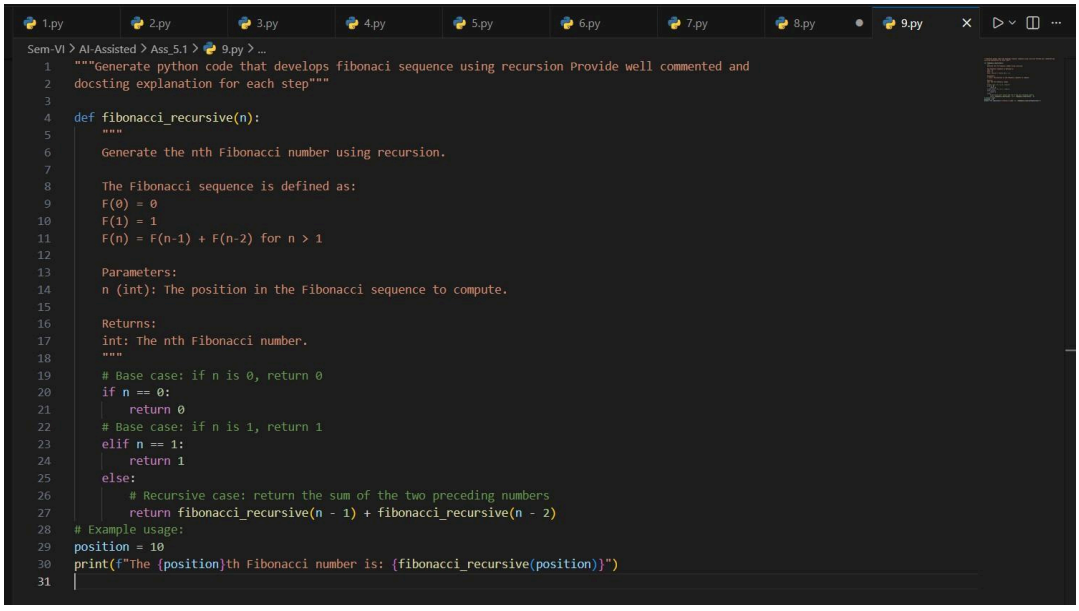
Task 8: (Transparency in Algorithm Optimization)
Description:
Use AI to generate two solutions for checking prime numbers:
Naive approach(basic)
Optimized approach
Prompt:
“Generate Python code for two prime-checking methods and explain how the optimized version improves performance.”
Expected Output:

- Code for both methods.
- Transparent explanation of time complexity.
- Comparison highlighting efficiency improvements.



```
"""
Generate two Python code one is bacic brute force whereas the other is optimized approach for two prime-checking methods
and explain how the optimized version improves performance.
"""

def brute_force_prime(n):
    # Handle edge cases:
    # Numbers less than or equal to 1 are NOT prime
    if n <= 1:
        return False

    # Try dividing n by every number from 2 to n-1
    for i in range(2, n):
        # If n is divisible by any number other than 1 and itself
        if n % i == 0:
            return False  # Not a prime number

    # If no divisors were found
    return True

def optimized_prime(n):
    # Handle edge cases first
    if n <= 1:
        return False

    # 2 is the only even prime number
    if n == 2:
        return True

    # Eliminate all other even numbers early
    # This avoids unnecessary loop iterations
    if n % 2 == 0:
        return False

    # Only check up to √n instead of n-1
    # Because if n = a * b, at least one of them must be ≤ √n
    limit = int(n ** 0.5) + 1

    # Skip even numbers by incrementing by 2
    # This halves the number of iterations
    for i in range(3, limit, 2):
        if n % i == 0:
            return False  # Composite number found early

    # If no divisors found up to √n
    return True

# Example usage:
number = 29
print(f"Brute-force check: Is {number} prime? {brute_force_prime(number)}")
print(f"Optimized check: Is {number} prime? {optimized_prime(number)}")
```

Task 9: (Transparency in Recursive Algorithms)
Objective: Use AI to generate a recursive function to calculate Fibonacci numbers.
Instructions:
Ask AI to add clear comments explaining recursion.
Ask AI to explain base cases and recursive calls.
Expected Output:
Well-commented recursive code.
Clear explanation of how recursion works.
Verification that explanation matches actual execution.



```
"""Generate python code that develops fibonaci sequence using recursion Provide well commented and
docstring explanation for each step"""

def fibonacci_recursive(n):
    """
    Generate the nth Fibonacci number using recursion.

    The Fibonacci sequence is defined as:
    F(0) = 0
    F(1) = 1
    F(n) = F(n-1) + F(n-2) for n > 1

    Parameters:
    n (int): The position in the Fibonacci sequence to compute.

    Returns:
    int: The nth Fibonacci number.
    """
    # Base case: if n is 0, return 0
    if n == 0:
        return 0
    # Base case: if n is 1, return 1
    elif n == 1:
        return 1
    else:
        # Recursive case: return the sum of the two preceding numbers
        return fibonacci_recursive(n - 1) + fibonacci_recursive(n - 2)
# Example usage:
position = 10
print(f"The {position}th Fibonacci number is: {fibonacci_recursive(position)}")
```

Task 10: (Transparency in Error Handling)
Task:
Use AI to generate a Python program that reads a file and processes data.
Prompt:
“Generate code with proper error handling and clear explanations for each exception.”
Expected Output:
Code with meaningful exception handling.
Clear comments explaining each error scenario.
Validation that explanations align with runtime behavior.