

Lab Assignment-5.1

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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 $5 \leq \text{exp} \leq 10 \text{ years}$ → 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.

Screenshots:

```
lab_05.py > Employee > calculate_salary
1 class Employee:
2     def __init__(self, em_id, emp_name, basic_salary, designation, experience):
3         self.em_id = em_id
4         self.emp_name = emp_name
5         self.basic_salary = basic_salary
6         self.designation = designation
7         self.experience = experience
8     def calculate_salary(self):
9         if self.experience > 10:
10             allowance = 0.20 * se
11             elif self.experience > 5:
                allowance = 0.15 * self.basic_salary
```

```

lab_05.py > Employee > display_employee_details
1 class Employee:
2     def __init__(self,em_id,emp_name,basic_salary,designation,experience):
3         self.em_id = em_id
4         self.emp_name = emp_name
5         self.basic_salary = basic_salary
6         self.designation = designation
7         self.experience = experience
8     def calculate_salary(self):
9         if self.experience>10:
10            allowance = 0.20*self.basic_salary
11        elif self.experience>=5 and self.experience<=10:
12            allowance = 0.10*self.basic_salary
13        elif self.experience<5:
14            allowance = 0.05*self.basic_salary
15        total_salary = self.basic_salary + allowance
16        return total_salary
17 def display_employee_details(self):
    print(f"Employee ID: {self.em_id}")
    print(f"Employee Name: {self.emp_name}")
    print(f"Designation: {self.designation}")
    print(f"Experience: {self.experience} years")
    print(f"Total Salary: {self.calculate_salary()}")

```

```

lab_05.py > Employee > display_employee_details
1 class Employee:
2     def __init__(self,em_id,emp_name,basic_salary,designation,experience):
3         self.em_id = em_id
4         self.emp_name = emp_name
5         self.basic_salary = basic_salary
6         self.designation = designation
7         self.experience = experience
8     def calculate_salary(self):
9         if self.experience>10:
10            allowance = 0.20*self.basic_salary
11        elif self.experience>=5 and self.experience<=10:
12            allowance = 0.10*self.basic_salary
13        elif self.experience<5:
14            allowance = 0.05*self.basic_salary
15        total_salary = self.basic_salary + allowance
16        return total_salary
17 def display_employee_details(self):
18     total_salary = self.calculate_salary()
19     print(f"Employee ID: {self.em_id}")
20     print(f"Employee Name: {self.emp_name}")
21     print(f"Designation: {self.designation}")
22     print(f"Experience: {self.experience} years")
23     print(f"Total Salary: {total_salary}")
24 # Example usage:
25 emp1 = Employee(101, "Alice Smith", 50000, "Software Engineer", 6)
26 emp1.display_employee_details()
27 emp2 = Employee(102, "Bob Johnson", 70000, "Senior Developer", 12)
28 emp2.display_employee_details()
29

```

Code:

```

class Employee:
    def __init__(self,em_id,emp_name,basic_salary,designation,experience):

```

```

        self.em_id = em_id
self.emp_name = emp_name
self.basic_salary = basic_salary
self.designation = designation
self.experience = experience    def
calculate_salary(self):        if
self.experience>10:
            allowance = 0.20*self.basic_salary
elif self.experience>=5 and self.experience<=10:
            allowance = 0.10*self.basic_salary
elif self.experience<5:
            allowance = 0.05*self.basic_salary
total_salary = self.basic_salary + allowance
return total_salary    def
display_employee_details(self):
            total_salary = self.calculate_salary()
print(f"Employee ID: {self.em_id}")        print(f"Employee Name:
{self.emp_name}")        print(f"Designation:
{self.designation}")        print(f"Experience: {self.experience}
years")        print(f"Total Salary: {total_salary}") # Example
usage: emp1 = Employee(101, "Alice Smith", 50000, "Software
Engineer", 6) emp1.display_employee_details()
emp2 = Employee(102, "Bob Johnson", 70000, "Senior Developer", 12)
emp2.display_employee_details()

```

output:

```

PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\tempCodeRunnerFile.py"
Employee ID: 101
Employee Name: Alice Smith
Designation: Software Engineer
Experience: 6 years
Total Salary: 55000.0
Employee ID: 102
Employee Name: Bob Johnson
Designation: Senior Developer
Experience: 12 years
Total Salary: 84000.0
PS C:\Users\arell\Music\aiac>

```

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 $\leq 100 \rightarrow ₹5$ per unit
- 101 to 300 units $\rightarrow ₹7$ per unit
- More than 300 units $\rightarrow ₹10$ per unit

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

Screenshots:

```
30 class ElectricityBill:
31     def __init__(self, customer_id, customer_name, units_consumed):
        self.customer_id = customer_id
        self.customer_name = customer_name
        self.units_consumed = units_consumed
    def calculate_bill(self):
        if self.units_consumed <= 100:
            rate = 1.5
        elif self.units_consumed <= 300:
            rate = 2.5
        else:
            rate = 4.0
        total_bill = self.units_consumed * rate
        return total_bill
    def display_bill_details(self):
        total_bill = self.calculate_bill()
        print(f"Customer ID: {self.customer_id}")
        print(f"Customer Name: {self.customer_name}")
        print(f"Units Consumed: {self.units_consumed}")
        print(f"Total Bill Amount: {total_bill}")
```

```
29 """
30 class ElectricityBill:
31     def __init__(self, customer_id, name, units_consumed):
32         self.customer_id = customer_id
33         self.name = name
34         self.units_consumed = units_consumed
35     def calculate_bill(self):
        if self.units_consumed <= 100:
            bill_amount = self.units_consumed * 5
        elif self.units_consumed <= 300:
            bill_amount = (100 * 5) + (self.units_consumed - 100) * 7
        else:
            bill_amount = (100 * 5) + (200 * 7) + (self.units_consumed - 300) * 10
        return bill_amount
```

```

27 emp2 = Employee(102, "Bob Johnson", 70000, "Senior Developer", 12)
28 emp2.display_employee_details()
29 """
30 class ElectricityBill:
31     def __init__(self, customer_id, name, units_consumed):
32         self.customer_id = customer_id
33         self.name = name
34         self.units_consumed = units_consumed
35     def calculate_bill(self):
36         if self.units_consumed <= 100:
37             bill_amount = self.units_consumed * 5
38         elif self.units_consumed <= 300:
39             bill_amount = (100 * 5) + (self.units_consumed - 100) * 7
40         else:
41             bill_amount = (100 * 5) + (200 * 7) + (self.units_consumed - 300) * 10
42         return bill_amount
43     def display_bill_details(self):
44         bill_amount = self.calculate_bill()
45         print(f"Customer ID: {self.customer_id}")
46         print(f"Customer Name: {self.name}")
47         print(f"Units Consumed: {self.units_consumed}")
48         print(f"Total Bill Amount: {bill_amount}")
49 # Example usage:
50 bill1 = ElectricityBill(201, "Charlie Brown", 250)
51 bill1.display_bill_details()
52 bill2 = ElectricityBill(202, "Diana Prince", 350)
53 bill2.display_bill_details()

```

Code:

```

class ElectricityBill:
    def __init__(self, customer_id, name, units_consumed):
        self.customer_id = customer_id
        self.name = name
        self.units_consumed = units_consumed
    def calculate_bill(self):
        if self.units_consumed <= 100:
            bill_amount = self.units_consumed * 5
        elif self.units_consumed <= 300:
            bill_amount = (100 * 5) + (self.units_consumed - 100) * 7
        else:
            bill_amount = (100 * 5) + (200 * 7) + (self.units_consumed - 300) * 10
        return bill_amount
    def display_bill_details(self):
        bill_amount = self.calculate_bill()
        print(f"Customer ID: {self.customer_id}")
        print(f"Customer Name: {self.name}")
        print(f"Units Consumed: {self.units_consumed}")
        print(f"Total Bill Amount: {bill_amount}") # Example usage:
bill1 = ElectricityBill(201, "Charlie Brown", 250)
bill1.display_bill_details()

```



```
bill2 = ElectricityBill(202, "Diana Prince", 350)
bill2.display_bill_details()
```

output:

```
PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Customer ID: 201
Customer Name: Charlie Brown
Units Consumed: 250
Total Bill Amount: 1550
Customer ID: 202
Customer Name: Diana Prince
Units Consumed: 350
Total Bill Amount: 2400
PS C:\Users\arell\Music\aiac>
```

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.

Screenshots:

```

55 class Product:
56     def __init__(self, product_id, product_name, price, category):
57         self.product_id = product_id
58         self.product_name = product_name
59         self.price = price
60         self.category = category
61     def apply_discount(self, discount_percentage):
62         if self.category.lower() == "electronics":
63             discount = 0.10 * self.price
64         elif self.category.lower() == "clothing":
65             discount = 0.15 * self.price
66         elif self.category.lower() == "groceries":
67             discount = 0.05 * self.price
68         else:
69             discount = 0
70         discounted_price = self.price - discount
71         return discounted_price
72     def display_product_details(self, discount_percentage):

```

```

55 class Product:
56     def __init__(self, product_id, product_name, price, category):
57         self.product_id = product_id
58         self.product_name = product_name
59         self.price = price
60         self.category = category
61     def apply_discount(self, discount_percentage):
62         if self.category.lower() == "electronics":
63             discount = 0.10 * self.price
64         elif self.category.lower() == "clothing":
65             discount = 0.15 * self.price
66         elif self.category.lower() == "groceries":
67             discount = 0.05 * self.price
68         else:
69             discount = 0
70         discounted_price = self.price - discount
71         return discounted_price
72     def display_product_details(self, discount_percentage):
        discounted_price = self.apply_discount(discount_percentage)
        print(f"Product ID: {self.product_id}")
        print(f"Product Name: {self.product_name}")
        print(f"Category: {self.category}")
        print(f"Original Price: {self.price}")
        print(f"Discounted Price: {discounted_price}")

```

```

55 class Product:
56     def __init__(self,product_id,product_name,price,category):
57         self.product_id = product_id
58         self.product_name = product_name
59         self.price = price
60         self.category = category
61     def apply_discount(self,discout_percentage):
62         if self.category.lower() == "electronics":
63             discount = 0.10 * self.price
64         elif self.category.lower() == "clothing":
65             discount = 0.15 * self.price
66         elif self.category.lower() == "groceries":
67             discount = 0.05 * self.price
68         else:
69             discount = 0
70         discounted_price = self.price - discount
71         return discounted_price
72     def display_product_details(self,discout_percentage):
73         discounted_price = self.apply_discount(discout_percentage)
74         print(f"Product ID: {self.product_id}")
75         print(f"Product Name: {self.product_name}")
76         print(f"Category: {self.category}")
77         print(f"Original Price: {self.price}")
78         print(f"Discounted Price: {discounted_price}")
79 # Example usage:
80 prod1 = Product(301, "Smartphone", 15000, "Electronics")
81 prod1.display_product_details(10)
82 prod2 = Product(302, "Jeans", 2000, "Clothing")
83 prod2.display_product_details(15)
84 prod3 = Product(303, "Rice", 500, "Groceries")
85 prod3.display_product_details(5)
86

```

Code:

```

class Product:
    def __init__(self,product_id,product_name,price,category):
        self.product_id = product_id
        self.product_name = product_name
        self.price = price
        self.category = category
    def apply_discount(self,discout_percentage):
        if self.category.lower() == "electronics":
            discount = 0.10 * self.price
        elif self.category.lower() == "clothing":
            discount = 0.15 * self.price
        elif self.category.lower() == "groceries":
            discount = 0.05 * self.price
        else:
            discount = 0
        discounted_price = self.price - discount
        return discounted_price
    def display_product_details(self,discout_percentage):

```



```

        discounted_price = self.apply_discount(discount_percentage)
print(f"Product ID: {self.product_id}")          print(f"Product Name:
{self.product_name}")          print(f"Category: {self.category}")
print(f"Original Price: {self.price}")          print(f"Discounted Price:
{discounted_price}") # Example usage: prod1 = Product(301, "Smartphone",
15000, "Electronics") prod1.display_product_details(10) prod2 =
Product(302, "Jeans", 2000, "Clothing") prod2.display_product_details(15)
prod3 = Product(303, "Rice", 500, "Groceries")
prod3.display_product_details(5)

```

output:

```

PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Product ID: 301
Product Name: Smartphone
Category: Electronics
Original Price: 15000
Discounted Price: 13500.0
Product ID: 302
Product Name: Jeans
Category: Clothing
Original Price: 2000
Discounted Price: 1700.0
Product ID: 303
Product Name: Rice
Category: Groceries
Original Price: 500
Discounted Price: 475.0
PS C:\Users\arell\Music\aiac>

```

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 $\leq 5 \rightarrow \text{₹}5$ per day
- 6 to 10 days late $\rightarrow \text{₹}7$ per day
- More than 10 days late $\rightarrow \text{₹}10$ per day

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

Screenshots:

```

87
88 class LibraryBook:
89     def __init__(self, book_id, title, author, genre, availability):
90         self.book_id = book_id
91         self.title = title
92         self.author = author
93         self.genre = genre
94         self.availability = availability
95     def check_availability(self):
96         return self.availability
97     def display_book_details(self):
98         availability_status = "Available" if self.availability else "Not Available"
99         print(f"Book ID: {self.book_id}")
100        print(f"Title: {self.title}")
101        print(f"Author: {self.author}")
102        print(f"Genre: {self.genre}")
103        print(f"Availability: {availability_status}")

```

```

87
88 class LibraryBook:
89     def __init__(self, book_id, title, author, barrower, days_late):
90         self.book_id = book_id
91         self.title = title
92         self.author = author
93         self.barrower = barrower
94         self.days_late = days_late
95     def calculate_fine(self):
96         if self.days_late <= 5:
97             fine = self.days_late * 5
98         elif self.days_late > 5 and self.days_late <= 10:
99             fine = (5 * 5) + (self.days_late - 5) * 10
100        elif self.days_late > 10:
101            fine = (5 * 5) + (5 * 10) + (self.days_late - 10) * 20
102        return fine
103    def display_book_details(self):
104        fine = self.calculate_fine()
105        print(f"Book ID: {self.book_id}")
106        print(f"Title: {self.title}")
107        print(f"Author: {self.author}")
108        print(f"Barrower: {self.barrower}")
109        print(f"Days Late: {self.days_late}")
110        print(f"Total Fine: {fine}")
111    # Example usage:
112    book1 = LibraryBook(401, "1984", "George Orwell", "Eve Adams", 7)
113    book1.display_book_details()
114    book2 = LibraryBook(402, "To Kill a Mockingbird", "Harper Lee", "Frank Miller", 12)
115    book2.display_book_details()
116

```

Code:

```

class LibraryBook:
    def __init__(self,book_id,title,author,barrower,days_late):
        self.book_id = book_id
    self.title = title
    self.author = author
    self.barrower = barrower
    self.days_late = days_late
    def calculate_fine(self):
        if self.days_late<=5:
            fine = self.days_late * 5
        elif self.days_late>5 and self.days_late<=10:
            fine = (5 * 5) + (self.days_late - 5) * 10
        elif self.days_late>10:
            fine = (5 * 5) + (5 * 10) + (self.days_late - 10) * 20
    return fine
    def display_book_details(self):
        fine = self.calculate_fine()
        print(f"Book ID: {self.book_id}")
        print(f"Title: {self.title}")
        print(f"Author: {self.author}")
        print(f"Barrower: {self.barrower}")
        print(f"Days Late: {self.days_late}")
        print(f"Total Fine: {fine}")
# Example usage: book1 = LibraryBook(401, "1984", "George Orwell", "Eve Adams", 7)
book1.display_book_details()
book2 = LibraryBook(402, "To Kill a Mockingbird", "Harper Lee", "Frank Miller", 12)
book2.display_book_details()

```

output:

```

PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Book ID: 401
Title: 1984
Author: George Orwell
Barrower: Eve Adams
Days Late: 7
Total Fine: 45
Book ID: 402
Title: To Kill a Mockingbird
Author: Harper Lee
Barrower: Frank Miller
Days Late: 12
Total Fine: 115
PS C:\Users\arell\Music\aiac>

```

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.

Screenshots:

```
def student_report(student_data):
    report = {}
    for student in student_data:
        name = student['name']
        scores = student['scores']
        total_score = sum(scores)
        average_score = total_score / len(scores) if scores else 0
        report[name] = {
            'Total Score': total_score,
            'Average Score': average_score
        }
    return report
```

```
166
167 def student_report(student_data):
168     report = {}
169     for student in student_data:
170         name = student['name']
171         scores = student['scores']
172         total_score = sum(scores)
173         average_score = total_score / len(scores) if scores else 0
174         pass_count = len([score for score in scores if score >= 40])
175         report[name] = {
176             'average_score': average_score,
177             'pass_count': pass_count
178         }
179     return report
180 # Example usage:
181 students = [
182     {'name': 'Alice', 'scores': [85, 42, 39, 76]},
183     {'name': 'Bob', 'scores': [90, 55, 28, 67]},
184     {'name': 'Charlie', 'scores': [49, 100, 38, 45]}
185 ]
186 report = student_report(students)
187 for name, details in report.items():
188     print(f"Student: {name}, Average Score: {details['average_score']}, Subjects Passed: {details['pass_count']}")
189
190
```


Code:

```
def student_report(student_data):
    report = {}
    for student in student_data:
        name = student['name']
        scores = student['scores']
        total_score = sum(scores)
        average_score = total_score / len(scores)
        if scores else 0
        pass_count = len([score for score in scores if score >= 40])
        report[name] = {
            'average_score': average_score,
            'pass_count': pass_count
        }
    return report #
Example usage:
students = [
    {'name': 'Alice', 'scores': [85, 42, 39, 76]},
    {'name': 'Bob', 'scores': [90, 55, 28, 67]},
    {'name': 'Charlie', 'scores': [49, 100, 38, 45]}
]
report = student_report(students)
for name, details in report.items():
    print(f"Student: {name}, Average Score: {details['average_score']}, Subjects Passed: {details['pass_count']}")
```

Output:

```
PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Student: Alice, Average Score: 60.5, Subjects Passed: 3
Student: Bob, Average Score: 60.0, Subjects Passed: 3
Student: Charlie, Average Score: 58.0, Subjects Passed: 3
PS C:\Users\arell\Music\aiac>
```

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.

Screenshots:

```
116
117 class TaxiRide:
118     def __init__(self,ride_id,driver_name,distance_traveled,waiting_time_minutes):
119         self.ride_id = ride_id
120         self.driver_name = driver_name
121         self.distance_traveled = distance_traveled
122         self.waiting_time_minutes = waiting_time_minutes
123     def calculate_fare(self):
124         if self.distance_traveled <= 10:
125             fare = self.distance_traveled * 15
126         elif self.distance_traveled > 10 and self.distance_traveled <= 30:
127             fare = (10 * 15) + (self.distance_traveled - 10) * 12
128         elif self.distance_traveled >30:
129             fare = (10 * 15) + (40 * 12) + (self.distance_traveled - 50) * 10
130         waiting_charge = self.waiting_time_minutes * 2
131         total_fare = fare + waiting_charge
132         return total_fare
133     def display_ride_details(self):|
134         total_fare = self.calculate_fare()
135         print(f"Ride ID: {self.ride_id}")
136         print(f"Driver Name: {self.driver_name}")
137         print(f"Distance Traveled: {self.distance_traveled} km")
138         print(f"Waiting Time: {self.waiting_time_minutes} minutes")
139         print(f"Total Fare: {total_fare}")
```

```

116
117 class TaxiRide:
118     def __init__(self,ride_id,driver_name,distance_traveled,waiting_time_minutes):
119         self.ride_id = ride_id
120         self.driver_name = driver_name
121         self.distance_traveled = distance_traveled
122         self.waiting_time_minutes = waiting_time_minutes
123     def calculate_fare(self):
124         if self.distance_traveled <= 10:
125             fare = self.distance_traveled * 15
126         elif self.distance_traveled > 10 and self.distance_traveled <= 30:
127             fare = (10 * 15) + (self.distance_traveled - 10) * 12
128         elif self.distance_traveled >30:
129             fare = (10 * 15) + (40 * 12) + (self.distance_traveled - 50) * 10
130         waiting_charge = self.waiting_time_minutes * 2
131         total_fare = fare + waiting_charge
132         return total_fare
133     def display_ride_details(self):
134         total_fare = self.calculate_fare()
135         print(f"Ride ID: {self.ride_id}")
136         print(f"Driver Name: {self.driver_name}")
137         print(f"Distance Traveled: {self.distance_traveled} km")
138         print(f"Waiting Time: {self.waiting_time_minutes} minutes")
139         print(f"Total Fare: {total_fare}")
140 # Example usage:
141 ride1 = TaxiRide(501, "George Harris", 25, 10)
142 ride1.display_ride_details()
143 ride2 = TaxiRide(502, "Hannah Lee", 55, 5)
144 ride2.display_ride_details()
145 |

```

Code:

```

class TaxiRide:
    def
__init__(self,ride_id,driver_name,distance_traveled,waiting_time_minutes):
    self.ride_id = ride_id

```

```

        self.driver_name = driver_name
self.distance_traveled = distance_traveled
self.waiting_time_minutes = waiting_time_minutes    def
calculate_fare(self):        if self.distance_traveled
<= 10:
        fare = self.distance_traveled * 15        elif
self.distance_traveled > 10 and self.distance_traveled <= 30:
        fare = (10 * 15) + (self.distance_traveled - 10) * 12
elif self.distance_traveled >30:
        fare = (10 * 15) + (40 * 12) + (self.distance_traveled - 50) * 10
waiting_charge = self.waiting_time_minutes * 2        total_fare = fare +
waiting_charge        return total_fare    def display_ride_details(self):
        total_fare = self.calculate_fare()        print(f"Ride ID:
{self.ride_id}")        print(f"Driver Name: {self.driver_name}")
print(f"Distance Traveled: {self.distance_traveled} km")
print(f"Waiting Time: {self.waiting_time_minutes} minutes")
print(f"Total Fare: {total_fare}") # Example usage: ride1 =
TaxiRide(501, "George Harris", 25, 10) ride1.display_ride_details()
ride2 = TaxiRide(502, "Hannah Lee", 55, 5) ride2.display_ride_details()

```

output:

```

Total Fine: 115
PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Ride ID: 501
Driver Name: George Harris
Distance Traveled: 25 km
Waiting Time: 10 minutes
Total Fare: 350
Ride ID: 502
Driver Name: Hannah Lee
Distance Traveled: 55 km
Waiting Time: 5 minutes
Total Fare: 690
PS C:\Users\arell\Music\aiac>

```

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

Screenshots:

```
147
148  def statistics_subjects(scores_list):
149      if not scores_list:
150          return None, None, None
151      lowest_score = min(scores_list)
152      highest_score = max(scores_list)
153      average_score = sum(scores_list) / len(scores_list)
154      numberofstudentspassed = len([score for score in scores_list if score >= 40])
155      numberoftsudentsfailed = len([score for score in scores_list if score < 40])
156      print(f"Number of Students Passed: {numberofstudentspassed}")
157      print(f"Number of Students Failed: {numberoftsudentsfailed}")
158      return lowest_score, highest_score, average_score
159  # Example usage:
160
```

```
147
148  def statistics_subjects(scores_list):
149      if not scores_list:
150          return None, None, None
151      lowest_score = min(scores_list)
152      highest_score = max(scores_list)
153      average_score = sum(scores_list) / len(scores_list)
154      numberofstudentspassed = len([score for score in scores_list if score >= 40])
155      numberoftsudentsfailed = len([score for score in scores_list if score < 40])
156      print(f"Number of Students Passed: {numberofstudentspassed}")
157      print(f"Number of Students Failed: {numberoftsudentsfailed}")
158      return lowest_score, highest_score, average_score
159
160  # Example usage:
161  scores = [85, 42, 39, 76, 90, 55, 28, 67, 49, 100]
162  lowest, highest, average = statistics_subjects(scores)
163  print(f"Lowest Score: {lowest}")
164  print(f"Highest Score: {highest}")
165  print(f"Average Score: {average}")
166
```

Code:

```

def statistics_subjects(scores_list):
if not scores_list:
    return None, None, None    lowest_score = min(scores_list)
highest_score = max(scores_list)    average_score = sum(scores_list) /
len(scores_list)    numberofstudentspassed = len([score for score in
scores_list if score >=
40])    numberoftsudentsfailed = len([score for score in scores_list if
score <
40])    print(f"Number of Students Passed:
{numberofstudentspassed}")    print(f"Number of Students Failed:
{numberoftsudentsfailed}")    return lowest_score,
highest_score, average_score

# Example usage: scores = [85, 42, 39, 76, 90, 55, 28,
67, 49, 100] lowest, highest, average =
statistics_subjects(scores) print(f"Lowest Score:
{lowest}") print(f"Highest Score: {highest}")
print(f"Average Score: {average}")

```

Output:

```

PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Number of Students Passed: 7
Number of Students Failed: 3
Lowest Score: 28
Highest Score: 90
Average Score: 56.0
PS C:\Users\arell\Music\aiac>

```

Task Description #8 (Transparency in Algorithm Optimization)

Task: 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.

Prompt:

#write a python code to print prime or not using basic method in an basic level of code without any function in native approach

Screenshots:

```
#write a python code to print prime or not using basic method in an basic level of code without any function in native approach
num = int(input("Enter a number: "))
if num > 1:
    for i in range(2, num):
        if (num % i) == 0:
            print(f"{num} is not a prime number")
            break
    else:
        print(f"{num} is a prime number")
```

```
#write a python code to print prime or not using basic method in an
num = int(input("Enter a number: "))
if num > 1:
    for i in range(2, int(num**0.5) + 1):
        if (num % i) == 0:
            print(f"{num} is not a prime number")
            break
    else:
        print(f"{num} is a prime number")
else:
    print(f"{num} is not a prime number")
```

Code:

```
#write a python code to print prime or not using basic method in an basic
level of code without any function in native approach num =
int(input("Enter a number: ")) if num > 1:    for i in range(2,
int(num**0.5) + 1):        if (num % i) == 0:
    print(f"{num} is not a prime number")
break    else:
    print(f"{num} is a prime number") else:
    print(f"{num} is not a prime number")
```

optimized code : prompt:

#write a python code to print weather the gievn number is prime or not in function method and in optimized way

```
#write a python code to print weather the gievn number is prime or not in function method and in optimized way
def is_prime(num):
    if num <= 1:
        return False
    for i in range(2, int(num**0.5) + 1):
        if num % i == 0:
            return False
    return True
```

```
201
202 #write a python code to print weather the gievn number is prime or not in function method and in optimized way
203 def is_prime(num):
204     if num <= 1:
205         return False
206     for i in range(2, int(num**0.5) + 1):
207         if (num % i) == 0:
208             return False
209     return True
210 # Example usage:
211 number = int(input("Enter a number: "))
212 if is_prime(number):
213     print(f"{number} is a prime number")
214 else:
215     print(f"{number} is not a prime number")
216
217 |
```

Code:

```
#write a python code to print weather the gievn number is prime or not in
function method and in optimized way
def is_prime(num):
    if num <= 1:
        return False
    for i in range(2, int(num**0.5) + 1):
        if (num % i) == 0:
            return False
    return True
# Example usage:
number = int(input("Enter a number: "))
if is_prime(number):
    print(f"{number} is a prime number")
else:
    print(f"{number} is not a prime number")
```

output:

```
PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\tempCodeRunnerFile.py"
Enter a number: 17
17 is a prime number
PS C:\Users\arell\Music\aiac> |
```


Explanation :

The first method uses a basic native approach without functions, where it directly checks if a number is prime by iterating from 2 to the square root of the number and breaking out of the loop immediately upon finding a divisor, printing the result inline within the control flow structure. The second method is an optimized function-based approach that encapsulates the prime-checking logic into a reusable [is_prime\(\)](#) function that returns a boolean value (True or False) for the given number; while both methods use the same efficient algorithm of checking only up to the square root of the number, the function-based approach is cleaner, more modular, and easier to reuse across multiple calls, whereas the first approach directly ties the logic to I/O operations and makes it difficult to reuse the logic without code duplication.

Task Description #9 (Transparency in Recursive Algorithms) Objective:

Use AI to generate a recursive function to calculate

Fibonacci numbers.

Instructions:

1. Ask AI to add clear comments explaining recursion.
2. 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.

Prompt:

#write a recursive function to calculate Fibonacci series up to n terms and explain the code and recursion in comments

Screenshots:

```

#write a recursive function to calculate Fibonacci series up to n terms and explain the code and recur
def fibonacci(n):
    # Base case: if n is 0, return an empty list
    if n <= 0:
        return []
    # Base case: if n is 1, return a list with the first Fibonacci number
    elif n == 1:
        return [0]
    # Base case: if n is 2, return a list with the first two Fibonacci numbers
    elif n == 2:
        return [0, 1]
    else:
        # Recursive case: get the Fibonacci series up to (n-1) terms
        fib_series = fibonacci(n - 1)
        # Calculate the next Fibonacci number by summing the last two numbers in the series
        next_fib = fib_series[-1] + fib_series[-2]
        # Append the next Fibonacci number to the series
        fib_series.append(next_fib)
        return fib_series

```

```

216
217 #write a recursive function to calculate Fibonacci series up to n terms and explain the code and recurisi
218 def fibonacci(n):
219     # Base case: if n is 0, return an empty list
220     if n <= 0:
221         return []
222     # Base case: if n is 1, return a list with the first Fibonacci number
223     elif n == 1:
224         return [0]
225     # Base case: if n is 2, return a list with the first two Fibonacci numbers
226     elif n == 2:
227         return [0, 1]
228     else:
229         # Recursive case: get the Fibonacci series up to (n-1) terms
230         fib_series = fibonacci(n - 1)
231         # Calculate the next Fibonacci number by summing the last two numbers in the series
232         next_fib = fib_series[-1] + fib_series[-2]
233         # Append the next Fibonacci number to the series
234         fib_series.append(next_fib)
235         return fib_series
236 # Example usage:
237 terms = int(input("Enter the number of terms for Fibonacci series: "))
238 fib_sequence = fibonacci(terms)
239 print(f"Fibonacci series up to {terms} terms: {fib_sequence}")
240
241
242

```

Code:

```

#write a recursive function to calculate Fibonacci series up to n terms and
explain the code and recursion in comments def fibonacci(n):
    # Base case: if n is 0, return an empty list
    if n <= 0:
        return []
    # Base case: if n is 1, return a list with the first Fibonacci number
    elif n == 1:
        return [0]

```

```

    # Base case: if n is 2, return a list with the first two
    Fibonacci numbers    elif n == 2:
        return [0, 1]
else:
    # Recursive case: get the Fibonacci series up to (n-1) terms
    fib_series = fibonacci(n - 1)
    # Calculate the next Fibonacci number by summing the last two
    numbers in the series    next_fib = fib_series[-1] + fib_series[-2]
# Append the next Fibonacci number to the series
fib_series.append(next_fib)    return fib_series # Example usage: terms =
int(input("Enter the number of terms for Fibonacci series: ")) fib_sequence =
fibonacci(terms) print(f"Fibonacci series up to {terms} terms:
{fib_sequence}")

```

output:

```

PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\tempCodeRunnerFile.py"
Enter the number of terms for Fibonacci series: 5
Fibonacci series up to 5 terms: [0, 1, 1, 2, 3]
PS C:\Users\arell\Music\aiac>

```

Explanation:

Comments explain the why and intent behind code, not just the what, so future readers (including you) can understand decisions, assumptions, and tricky logic quickly without re-deriving it. They make maintenance, debugging, and collaboration easier by clarifying purpose, edge cases, and expected behavior, especially when the code is complex or not self-explanatory.

Task Description #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.

Prompt:

#write a python program that reads a text file and processes the data Generate code with proper error handling and clear explanations for each exception

Screenshots:

```
#write a python program that reads a text file and processes the data Generate code with proper error handling and clear explanations for each exception
try:
    # Attempt to open the file in read mode
    with open('data.txt', 'r') as file:
        try:
            # Read the contents of the file
            data = file.read()
            # Process the data (for example, count the number of lines)
            lines = data.splitlines()
            print(f"The file contains {len(lines)} lines.")
        except Exception as e:
            # Handle any exceptions that occur during data processing
            print(f"An error occurred while processing the data: {e}")
```

```
#write a python program that reads a text file and processes the data Generate code with proper error handling and clear explanations for each exception
try:
    # Attempt to open the file in read mode
    with open('data.txt', 'r') as file:
        try:
            # Read the contents of the file
            data = file.read()
            # Process the data (for example, count the number of lines)
            lines = data.splitlines()
            print(f"The file contains {len(lines)} lines.")
        except Exception as e:
            # Handle any exceptions that occur during data processing
            print(f"An error occurred while processing the data: {e}")
except FileNotFoundError:
    # Handle the case where the file does not exist
    print("Error: The file 'data.txt' was not found.")
except IOError:
    # Handle other I/O errors
    print("Error: An I/O error occurred while trying to read the file.")
except Exception as e:
    # Handle any other unexpected exceptions
    print(f"An unexpected error occurred: {e}")
```

Code:

```
#write a python program that reads a text file and processes the data
Generate code with proper error handling and clear explanations for
each exception try:
```



```

    # Attempt to open the file in read mode
with open('data.txt', 'r') as file:
try:
    # Read the contents of the file
    data = file.read()
    # Process the data (for example, count the number of lines)
    lines = data.splitlines()
    print(f"The file contains {len(lines)} lines.")
except Exception as e:
    # Handle any exceptions that occur during data processing
    print(f"An error occurred while processing the data: {e}")
except FileNotFoundError:
    # Handle the case where the file does not exist
    print("Error: The file 'data.txt' was not found.")
except IOError:
    # Handle other I/O errors
    print("Error: An I/O error occurred while trying to read the file.")
except Exception as e:
    # Handle any other unexpected exceptions
    print(f"An unexpected error occurred: {e}")

```

output:

```

PS C:\Users\arell\Music\aiac> python -u "c:\Users\arell\Music\aiac\lab_05.py"
The file contains 1 lines.
PS C:\Users\arell\Music\aiac> 

```

```

PS C:\Users\arell\Music\aiac> 

```

```

> python -u "c:\Users\arell\Music\aiac\lab_05.py"
Error: The file 'data.txt' was not found.

```

Explanation:

That error-handling block tries to open [data.txt](#) and read it safely: the outer try opens the file, and if it's missing it catches `FileNotFoundError`, while other I/O problems are caught by `IOError`. Inside, a nested try handles problems that might occur while processing the file content (like splitting or counting), and any unexpected issues fall to the final generic `Exception` handler, so the program fails gracefully with clear messages instead of crashing.

