ASSIGNMENT-7.4

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Task Description #1:

• Introduce a buggy Python function that calculates the factorial of a number using recursion. Use Copilot or Cursor AI to detect and fix the logical or syntax errors

```
def factr(n):
    if n == 0:
        return 0
    elif n == 1:
        return 1
    else:
        return n * factr(n - 2)

print(factr("5"))
```

PROMPT:

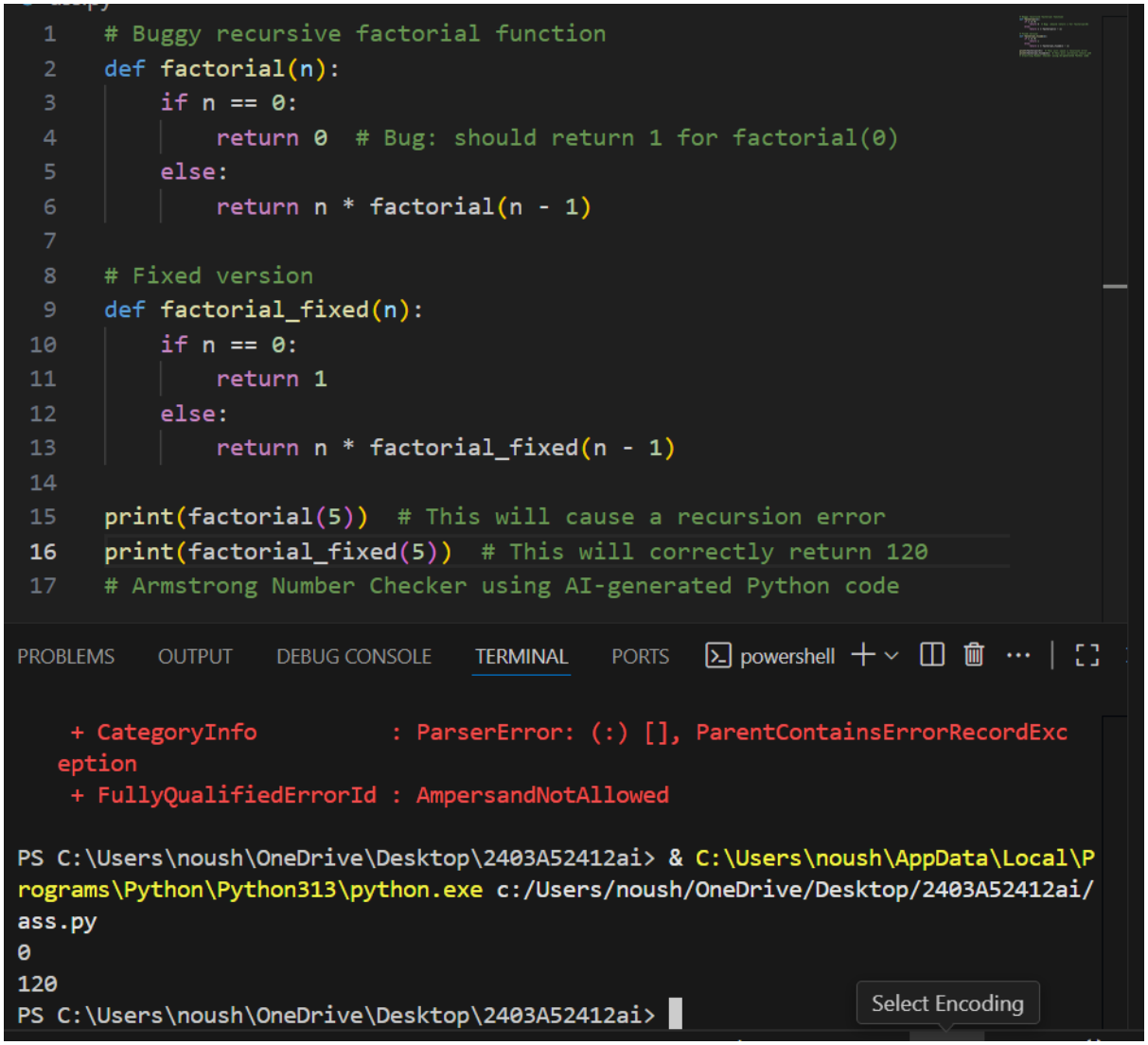
Write a recursive function to calculate the factorial of a number in Python. Also, fix any bugs in the implementation if present. Additionally, include a comment or section for an Armstrong Number Checker using AI-generated Python code.

CODE:

```
# Buggy recursive factorial function
def factorial(n):
    if n == 0:
        return 0  # Bug: should return 1 for factorial(0)
    else:
        return n * factorial(n - 1)

# Fixed version
def factorial_fixed(n):
    if n == 0:
```

```
        return 1
    else:
        return n * factorial_fixed(n - 1)

print(factorial(5))  # This will cause a recursion error
print(factorial_fixed(5))  # This will correctly return 120
# Armstrong Number Checker using AI-generated Python code
```

CODE AND OUTPUT:



OBSERVATION:

1. The code demonstrates a buggy and a corrected recursive factorial function in Python.
2. The buggy version returns 0 for factorial(0), while the fixed version correctly returns 1.

Task Description #2:

• Provide a list sorting function that fails due to a type error (e.g., sorting list with mixed integers and strings). Prompt AI to detect the issue and fix the code for consistent sorting.

```
def sort_list(data):
    return sorted(data)

items = [3, "apple", 1, "banana", 2]
print(sort_list(items))
```

PROMPT:

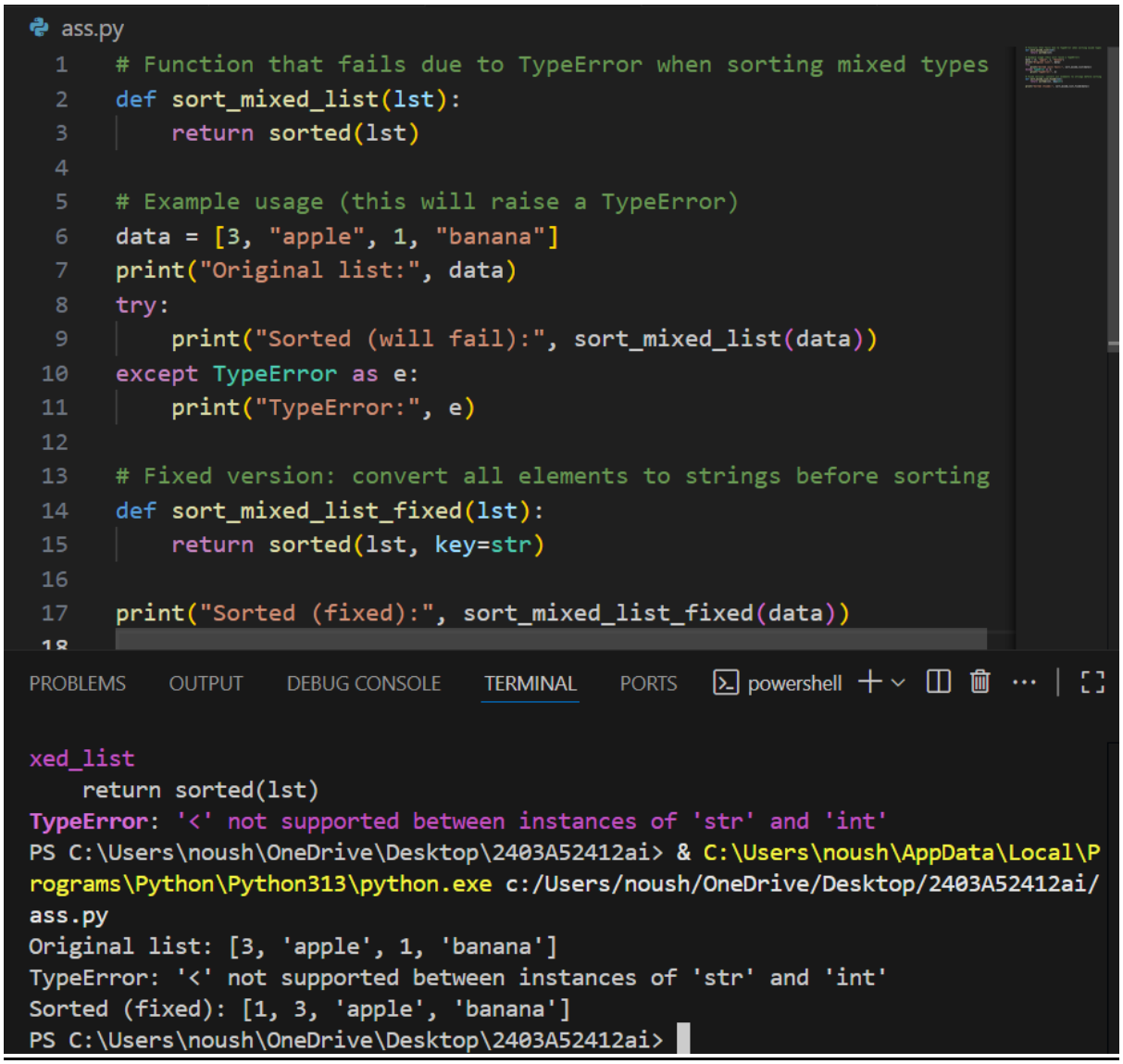
Write a Python function that attempts to sort a list containing both integers and strings, causing a TypeError. Then, detect and fix the issue so the list can be sorted consistently.

CODE:

```
 # Function that fails due to TypeError when sorting mixed types
def sort_mixed_list(lst):
    return sorted(lst)


# Example usage (this will raise a TypeError)
data = [3, "apple", 1, "banana"]
print("Original list:", data)
try:
    print("Sorted (will fail):", sort_mixed_list(data))
except TypeError as e:
```

```
    print("TypeError:", e)

# Fixed version: convert all elements to strings before sorting
def sort_mixed_list_fixed(lst):
    return sorted(lst, key=str)

print("Sorted (fixed):", sort_mixed_list_fixed(data))
```

CODE AND OUTPUT:



OBSERVATION:

This code demonstrates that sorting a list with mixed data types (integers and strings) in Python raises a TypeError. It then provides a fixed version of the sorting function that converts all elements to strings before sorting, allowing the mixed list to be sorted without errors.

Task Description #3:

• Write a Python snippet for file handling that opens a file but forgets to close it. Ask Copilot or Cursor AI to improve it using the best practice (e.g., with open() block).

Code1

```
with open("example.txt", "w") as f:
    f.write("Hello, world!")
```

Code2

```
f1 = open("data1.txt", "w")
f2 = open("data2.txt", "w")

f1.write("First file content\n")
f2.write("Second file content\n")

print("Files written successfully")
```

Code3

```
data = open("input.txt", "r").readlines()
output = open("output.txt", "w")

for line in data:
    output.write(line.upper())

print("Processing done")
```

Code4

```
f = open("numbers.txt", "r")
nums = f.readlines()

squares = []
for n in nums:
    n = n.strip()
    if n.isdigit():
        squares.append(int(n) * int(n))

f2 = open("squares.txt", "w")
for sq in squares:
    f2.write(str(sq) + "\n")

print("Squares written")
```

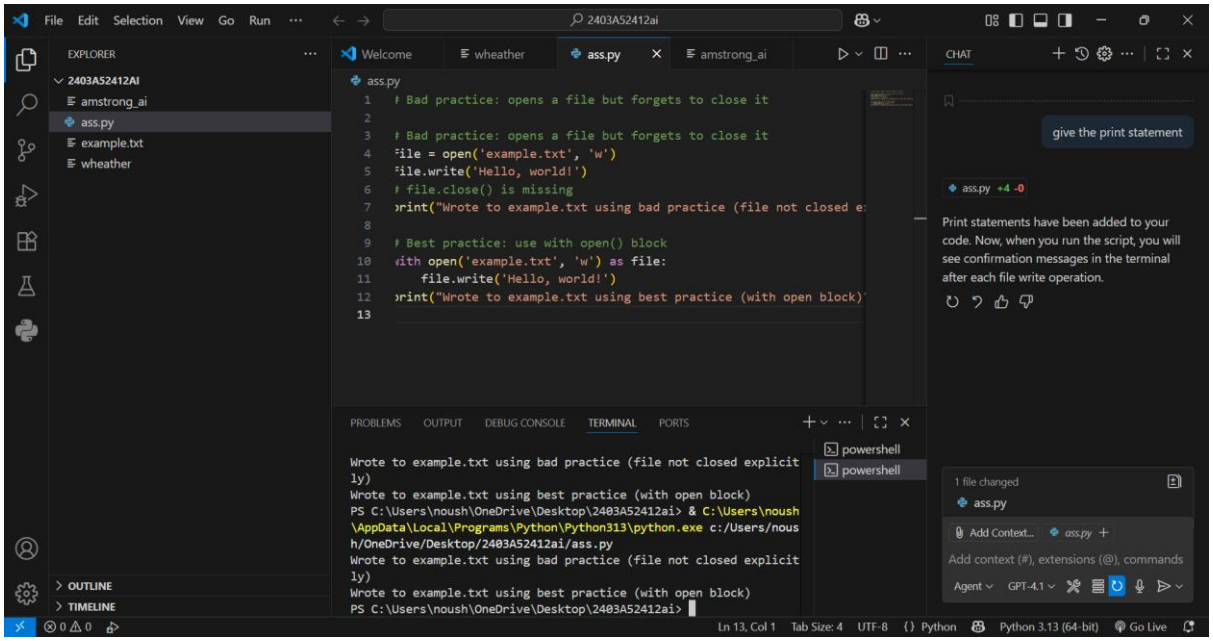
PROMPT:

Write a Python snippet that demonstrates bad file handling by opening a file and forgetting to close it, then improve it using the best practice (with open() block). Add print statements to confirm each file write operation.

CODE:

```
# Bad practice: opens a file but forgets to close it


# Bad practice: opens a file but forgets to close it
file = open('example.txt', 'w')
file.write('Hello, world!')
# file.close() is missing
print("Wrote to example.txt using bad practice (file not closed explicitly)")


# Best practice: use with open() block
with open('example.txt', 'w') as file:
    file.write('Hello, world!')
print("Wrote to example.txt using best practice (with open block)")
```

CODE AND OUTPUT:



OBESRVATION:

1. The code first writes to a file without closing it, which is bad practice.
2. It then demonstrates the correct way using a with open() block, ensuring the file is properly closed.

Task Description #4:

• Provide a piece of code with a ZeroDivisionError inside a loop. Ask AI to add error handling using try-except and continue execution safely.

```
def compute_ratios(values):
    results = []
    for i in range(len(values)):
        for j in range(i, len(values)):
            ratio = values[i] / (values[j] - values[i])
            results.append((i, j, ratio))
    return results

nums = [5, 10, 15, 20, 25]
print(compute_ratios(nums))
```

PROMPT:

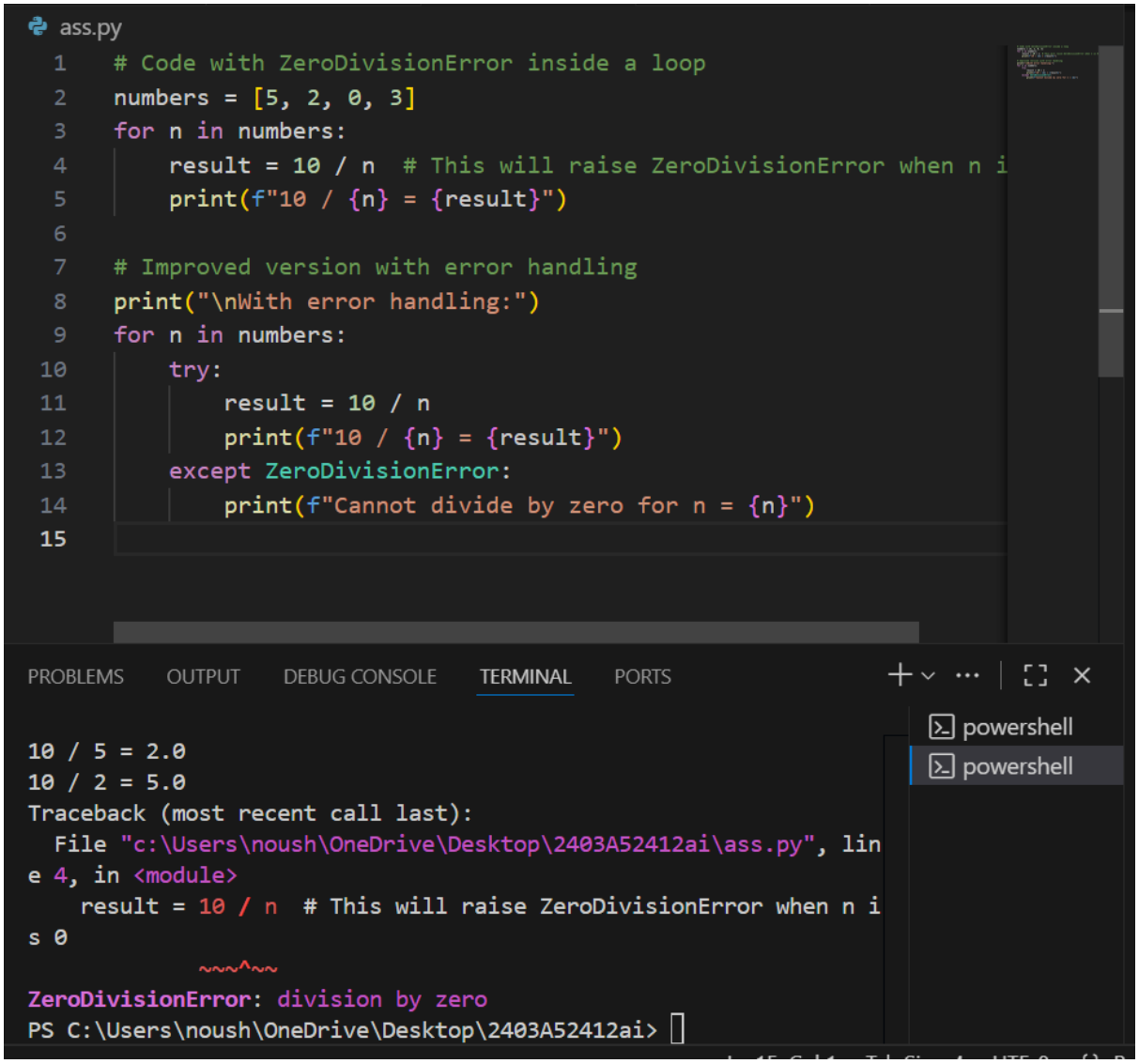
Write a Python loop that causes a ZeroDivisionError when dividing by zero, then improve the code by adding try-except error handling to continue execution safely.

CODE:

Code with ZeroDivisionError inside a loop

```
numbers = [5, 2, 0, 3]
for n in numbers:
    result = 10 / n  # This will raise ZeroDivisionError when n is 0
    print(f"10 / {n} = {result}")

# Improved version with error handling
print("\nWith error handling:")
for n in numbers:
    try:
        result = 10 / n
        print(f"10 / {n} = {result}")
    except ZeroDivisionError:
        print(f"Cannot divide by zero for n = {n}")
```

CODE AND OUTPUT:



OBSERVATION:

1. The code first demonstrates a ZeroDivisionError when dividing by zero inside a loop.
2. It then shows how to handle the error using try-except, allowing the loop to continue safely without crashing.

Task Description #5:

• Include a buggy class definition with incorrect __init__ parameters or attribute references. Ask AI to analyze and correct the constructor and attribute usage.

Incorrect Code:

```
class StudentRecord:
    def __init__(self, name, id, courses=[]):
        self.studentName = names
        self.student_id = id
        self.courses = courseList

    def add_course(self, course):
        self.courses.append(course)
```

```
    def get_summary(self):
        return f"Student: {self.studentName}, ID: {self.student_id}, Courses: {', '.join(self.courses)}"

class Department:
    def __init__(self, deptName, students=None):
        self.dept_name = deptName
        self.students = students

    def enroll_student(self, student):
        self.students.append(student)

    def department_summary(self):
        return f"Department: {self.dept_name}, Total Students: {len(self.student)}"


s1 = StudentRecord("Alice", 101, ["Math", "Science"])
d1 = Department("Computer Science")
d1.enroll_student(s1)
print(s1.get_summary())
print(d1.department_summary())
```

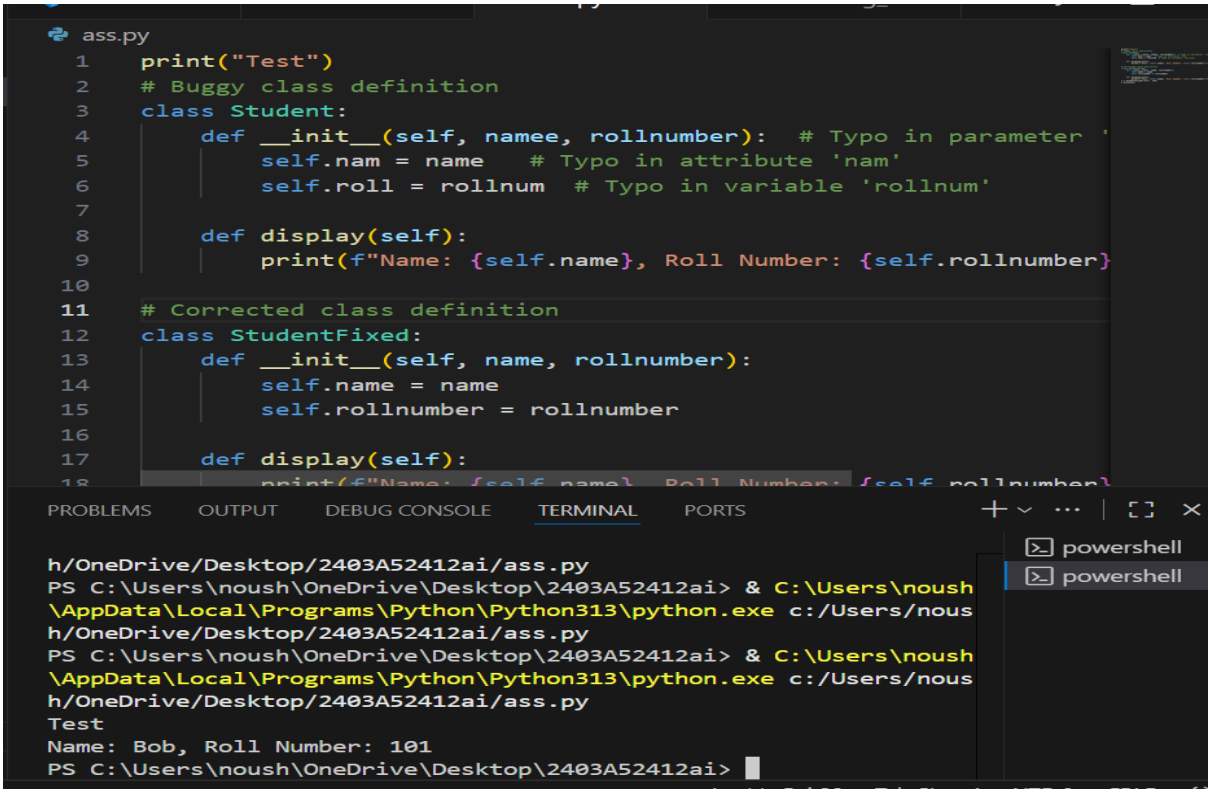
Prompt:

Write a buggy Python class with incorrect **init** parameters and attribute references, then correct the constructor and attribute usage. Add code to create an object and display its information. Include a print statement to verify output.

CODE:

```
print("Test")
# Buggy class definition
class Student:
    def __init__(self, namee, rollnumber):  # Typo in parameter 'namee'
        self.nam = name   # Typo in attribute 'nam'
        self.roll = rollnum  # Typo in variable 'rollnum'

    def display(self):
        print(f"Name: {self.name}, Roll Number: {self.rollnumber}")  # AttributeErr
# Corrected class definition
class StudentFixed:
    def __init__(self, name, rollnumber):
        self.name = name
        self.rollnumber = rollnumber

    def display(self):
        print(f"Name: {self.name}, Roll Number: {self.rollnumber}")
s = StudentFixed("Bob", 101)
s.display()
```

CODE AND OUTPUT:



OBSERVATION:

1. The code demonstrates both a buggy and a corrected class definition, highlighting common mistakes in constructor and attribute naming.
2. The corrected class is instantiated and its method is called, and a print statement at the top confirms that output is working.