AI Assisted Coding Assignment - 7.1
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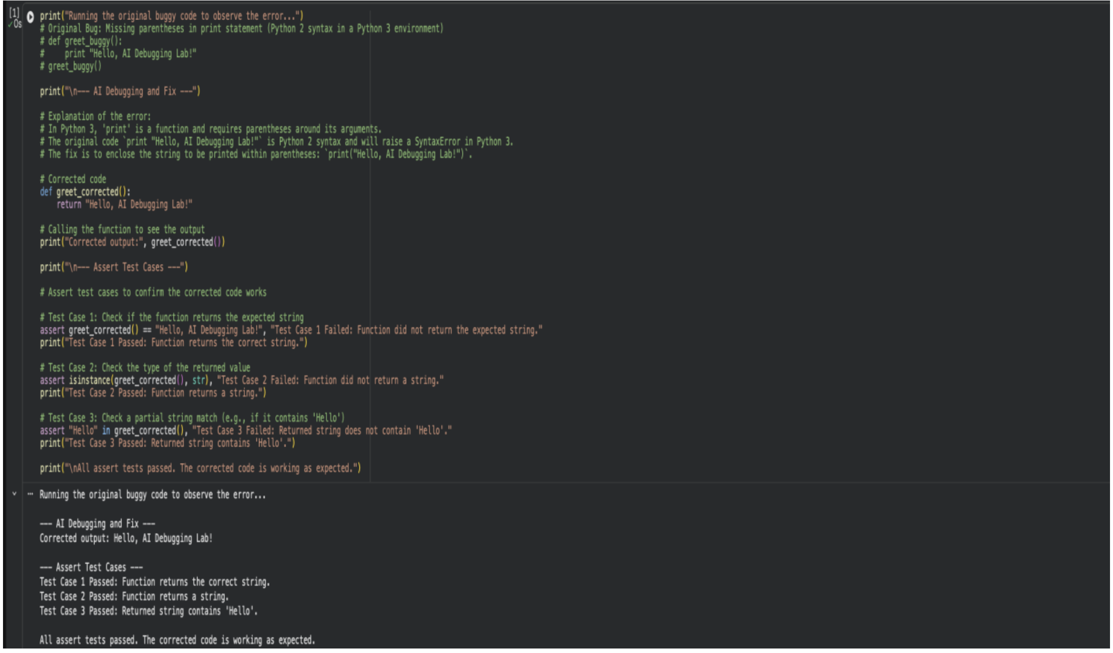
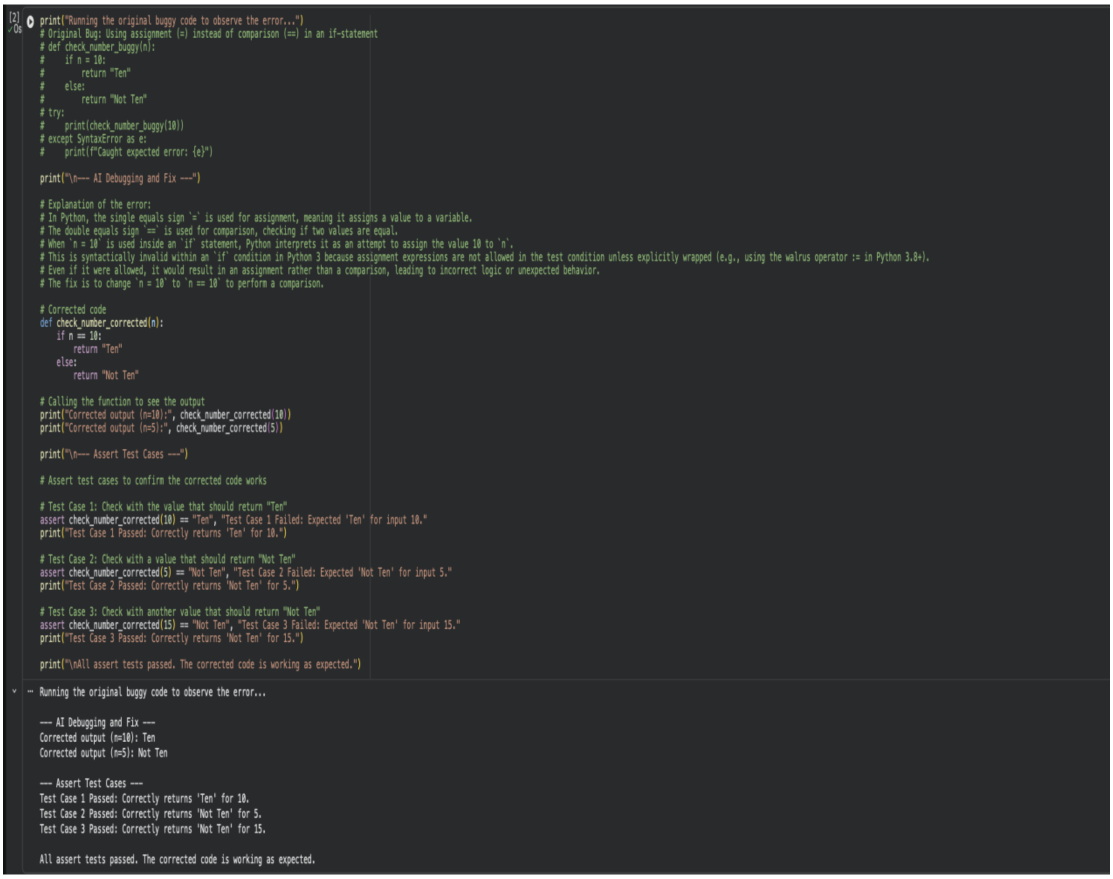
Task Description #1 (Syntax Errors – Missing Parentheses in Print Statement)Task: Provide a Python snippet with a missing parenthesis in a printstatement (e.g., print "Hello"). Use AI to detect and fix the syntax error.



```
print("Running the original buggy code to observe the error...")
# Original Bug: Missing parentheses in print statement (Python 2 syntax in a Python 3 environment)
# def greet_buggy():
#     print "Hello, AI Debugging Lab!"
# greet_buggy()

print("\n--- AI Debugging and Fix ---")

# Explanation of the error:
# In Python 3, 'print' is a function and requires parentheses around its arguments.
# The original code `print "Hello, AI Debugging Lab!"` is Python 2 syntax and will raise a SyntaxError in Python 3.
# The fix is to enclose the string to be printed within parentheses: `print("Hello, AI Debugging Lab!")`.

# Corrected code
def greet_corrected():
    return "Hello, AI Debugging Lab!"

# Calling the function to see the output
print("Corrected output:", greet_corrected())

print("\n--- Assert Test Cases ---")

# Assert test cases to confirm the corrected code works

# Test Case 1: Check if the function returns the expected string
assert greet_corrected() == "Hello, AI Debugging Lab!", "Test Case 1 Failed: Function did not return the expected string."
print("Test Case 1 Passed: Function returns the correct string.")

# Test Case 2: Check the type of the returned value
assert isinstance(greet_corrected(), str), "Test Case 2 Failed: Function did not return a string."
print("Test Case 2 Passed: Function returns a string.")

# Test Case 3: Check a partial string match (e.g., if it contains 'Hello')
assert "Hello" in greet_corrected(), "Test Case 3 Failed: Returned string does not contain 'Hello'."
print("Test Case 3 Passed: Returned string contains 'Hello'.")

print("\nAll assert tests passed. The corrected code is working as expected.")
```

```
Running the original buggy code to observe the error...

--- AI Debugging and Fix ---
Corrected output: Hello, AI Debugging Lab!

--- Assert Test Cases ---
Test Case 1 Passed: Function returns the correct string.
Test Case 2 Passed: Function returns a string.
Test Case 3 Passed: Returned string contains 'Hello'.

All assert tests passed. The corrected code is working as expected.
```

Task Description #2 (Incorrect condition in an If Statement)
Task: Supply a function where an if-condition mistakenly uses = instead of ==. Let AI identify and fix the issue.

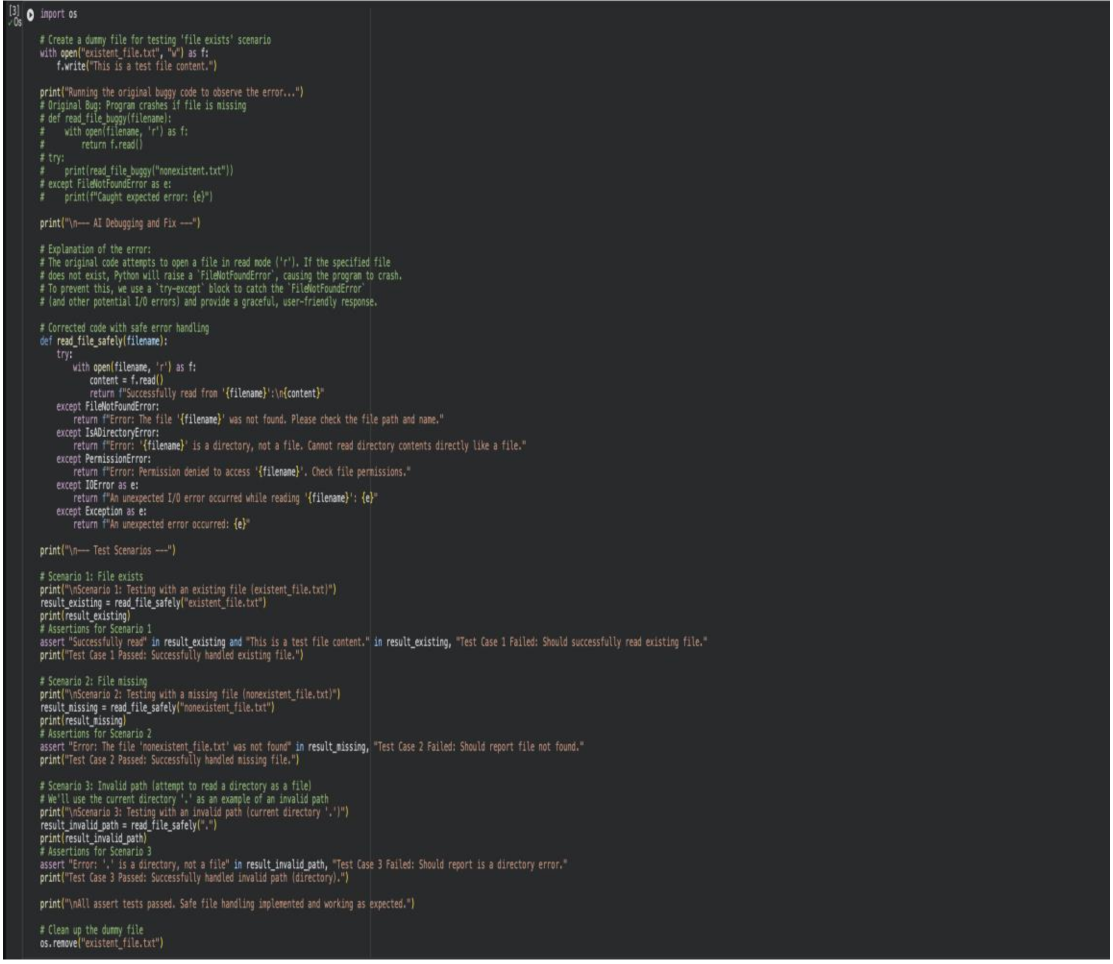


```python
print("Running the original buggy code to observe the error...")
# Original Bug: Using assignment (=) instead of comparison (==) in an if-statement
# def check_number_buggy(n):
#     if n = 10:
#         return "Ten"
#     else:
#         return "Not Ten"
# try:
#     print(check_number_buggy(10))
# except SyntaxError as e:
#     print(f"Caught expected error: {e}")

print("\n--- AI Debugging and Fix ---")

# Explanation of the error:
# In Python, the single equals sign `=` is used for assignment, meaning it assigns a value to a variable.
# The double equals sign `==` is used for comparison, checking if two values are equal.
# When `n = 10` is used inside an `if` statement, Python interprets it as an attempt to assign the value 10 to `n`.
# This is syntactically invalid within an `if` condition in Python 3 because assignment expressions are not allowed in the test condition unless explicitly wrapped (e.g., using the walrus operator := in Python 3.8+).
# Even if it were allowed, it would result in an assignment rather than a comparison, leading to incorrect logic or unexpected behavior.
# The fix is to change `n = 10` to `n == 10` to perform a comparison.

# Corrected code
def check_number_corrected(n):
    if n == 10:
        return "Ten"
    else:
        return "Not Ten"

# Calling the function to see the output
print("Corrected output (n=10):", check_number_corrected(10))
print("Corrected output (n=5):", check_number_corrected(5))

print("\n--- Assert Test Cases ---")

# Assert test cases to confirm the corrected code works

# Test Case 1: Check with the value that should return "Ten"
assert check_number_corrected(10) == "Ten", "Test Case 1 Failed: Expected 'Ten' for input 10."
print("Test Case 1 Passed: Correctly returns 'Ten' for 10.")

# Test Case 2: Check with a value that should return "Not Ten"
assert check_number_corrected(5) == "Not Ten", "Test Case 2 Failed: Expected 'Not Ten' for input 5."
print("Test Case 2 Passed: Correctly returns 'Not Ten' for 5.")

# Test Case 3: Check with another value that should return "Not Ten"
assert check_number_corrected(15) == "Not Ten", "Test Case 3 Failed: Expected 'Not Ten' for input 15."
print("Test Case 3 Passed: Correctly returns 'Not Ten' for 15.")

print("\nAll assert tests passed. The corrected code is working as expected.")
```

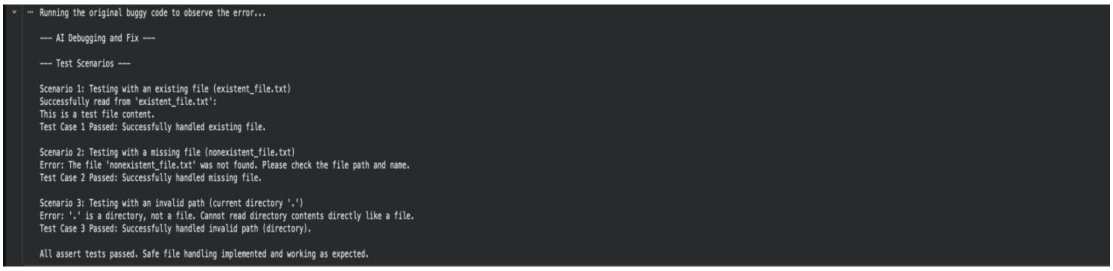
```
Running the original buggy code to observe the error...

--- AI Debugging and Fix ---
Corrected output (n=10): Ten
Corrected output (n=5): Not Ten

--- Assert Test Cases ---
Test Case 1 Passed: Correctly returns 'Ten' for 10.
Test Case 2 Passed: Correctly returns 'Not Ten' for 5.
Test Case 3 Passed: Correctly returns 'Not Ten' for 15.

All assert tests passed. The corrected code is working as expected.
```

Task Description #3 (Runtime Error – File Not Found)
Task: Provide code that attempts to open a non-existent file and

crashes. Use AI to apply safe error handling.



```python
import os

# Create a dummy file for testing 'file exists' scenario
with open("existent_file.txt", "w") as f:
    f.write("This is a test file content.")

print("Running the original buggy code to observe the error...")
# Original Bug: Program crashes if file is missing
# def read_file_buggy(filename):
#     with open(filename, 'r') as f:
#         return f.read()
# try:
#     print(read_file_buggy("nonexistent.txt"))
# except FileNotFoundError as e:
#     print(f"Caught expected error: {e}")

print("\n--- AI Debugging and Fix ---")

# Explanation of the error:
# The original code attempts to open a file in read mode ('r'). If the specified file
# does not exist, Python will raise a `FileNotFoundError`, causing the program to crash.
# To prevent this, we use a `try-except` block to catch the `FileNotFoundError`
# (and other potential I/O errors) and provide a graceful, user-friendly response.

# Corrected code with safe error handling
def read_file_safely(filename):
    try:
        with open(filename, 'r') as f:
            content = f.read()
            return f"Successfully read from '{filename}':\n{content}"
    except FileNotFoundError:
        return f"Error: The file '{filename}' was not found. Please check the file path and name."
    except IsADirectoryError:
        return f"Error: '{filename}' is a directory, not a file. Cannot read directory contents directly like a file."
    except PermissionError:
        return f"Error: Permission denied to access '{filename}'. Check file permissions."
    except IOError as e:
        return f"An unexpected I/O error occurred while reading '{filename}': {e}"
    except Exception as e:
        return f"An unexpected error occurred: {e}"

print("\n--- Test Scenarios ---")

# Scenario 1: File exists
print("\nScenario 1: Testing with an existing file (existent_file.txt)")
result_existing = read_file_safely("existent_file.txt")
print(result_existing)
# Assertions for Scenario 1
assert "Successfully read" in result_existing and "This is a test file content." in result_existing, "Test Case 1 Failed: Should successfully read existing file."
print("Test Case 1 Passed: Successfully handled existing file.")

# Scenario 2: File missing
print("\nScenario 2: Testing with a missing file (nonexistent_file.txt)")
result_missing = read_file_safely("nonexistent_file.txt")
print(result_missing)
# Assertions for Scenario 2
assert "Error: The file 'nonexistent_file.txt' was not found" in result_missing, "Test Case 2 Failed: Should report file not found."
print("Test Case 2 Passed: Successfully handled missing file.")

# Scenario 3: Invalid path (attempt to read a directory as a file)
# We'll use the current directory '.' as an example of an invalid path
print("\nScenario 3: Testing with an invalid path (current directory '.')")
result_invalid_path = read_file_safely(".")
print(result_invalid_path)
# Assertions for Scenario 3
assert "Error: '.' is a directory, not a file" in result_invalid_path, "Test Case 3 Failed: Should report is a directory error."
print("Test Case 3 Passed: Successfully handled invalid path (directory).")

print("\nAll assert tests passed. Safe file handling implemented and working as expected.")

# Clean up the dummy file
os.remove("existent_file.txt")
```



```
Running the original buggy code to observe the error...

--- AI Debugging and Fix ---

--- Test Scenarios ---

Scenario 1: Testing with an existing file (existent_file.txt)
Successfully read from 'existent_file.txt':
This is a test file content.
Test Case 1 Passed: Successfully handled existing file.

Scenario 2: Testing with a missing file (nonexistent_file.txt)
Error: The file 'nonexistent_file.txt' was not found. Please check the file path and name.
Test Case 2 Passed: Successfully handled missing file.

Scenario 3: Testing with an invalid path (current directory '.')
Error: '.' is a directory, not a file. Cannot read directory contents directly like a file.
Test Case 3 Passed: Successfully handled invalid path (directory).

All assert tests passed. Safe file handling implemented and working as expected.
```

Task Description #4 (Calling a Non-Existent Method)

Task: Give a class where a non-existent method is called (e.g., obj.undefined_method()). Use AI to debug and fix.

```
# Bug: Calling an undefined method
class Car:
def start(self):
return "Car started"
my_car = Car()
print(my_car.drive()) # drive() is not defined
```

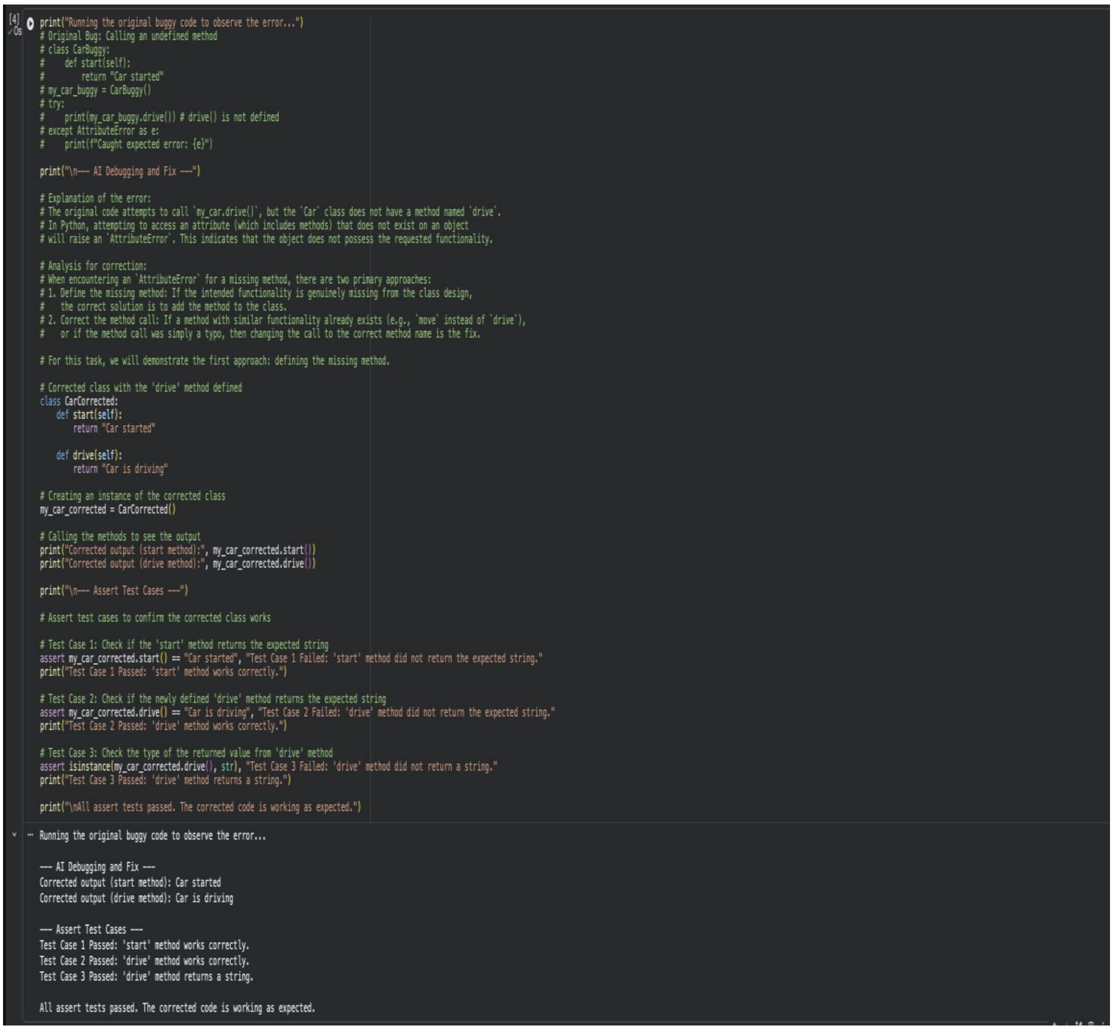
Requirements:

- Students must analyze whether to define the missing method or correct the method call.

- Use 3 assert tests to confirm the corrected class works.

Expected Output #4:

- Corrected class with clear AI explanation.



```
print("Running the original buggy code to observe the error...")
# Original Bug: Calling an undefined method
# class CarBuggy:
#     def start(self):
#         return "Car started"
# my_car_buggy = CarBuggy()
# try:
#     print(my_car_buggy.drive()) # drive() is not defined
# except AttributeError as e:
#     print(f"Caught expected error: {e}")

print("\n--- AI Debugging and Fix ---")

# Explanation of the error:
# The original code attempts to call `my_car.drive()`, but the `Car` class does not have a method named `drive`.
# In Python, attempting to access an attribute (which includes methods) that does not exist on an object
# will raise an `AttributeError`. This indicates that the object does not possess the requested functionality.

# Analysis for correction:
# When encountering an `AttributeError` for a missing method, there are two primary approaches:
# 1. Define the missing method: If the intended functionality is genuinely missing from the class design,
#    the correct solution is to add the method to the class.
# 2. Correct the method call: If a method with similar functionality already exists (e.g., `move` instead of `drive`),
#    or if the method call was simply a typo, then changing the call to the correct method name is the fix.

# For this task, we will demonstrate the first approach: defining the missing method.

# Corrected class with the 'drive' method defined
class CarCorrected:
    def start(self):
        return "Car started"

    def drive(self):
        return "Car is driving"

# Creating an instance of the corrected class
my_car_corrected = CarCorrected()

# Calling the methods to see the output
print("Corrected output (start method):", my_car_corrected.start())
print("Corrected output (drive method):", my_car_corrected.drive())

print("\n--- Assert Test Cases ---")

# Assert test cases to confirm the corrected class works

# Test Case 1: Check if the 'start' method returns the expected string
assert my_car_corrected.start() == "Car started", "Test Case 1 Failed: 'start' method did not return the expected string."
print("Test Case 1 Passed: 'start' method works correctly.")

# Test Case 2: Check if the newly defined 'drive' method returns the expected string
assert my_car_corrected.drive() == "Car is driving", "Test Case 2 Failed: 'drive' method did not return the expected string."
print("Test Case 2 Passed: 'drive' method works correctly.")

# Test Case 3: Check the type of the returned value from 'drive' method
assert isinstance(my_car_corrected.drive(), str), "Test Case 3 Failed: 'drive' method did not return a string."
print("Test Case 3 Passed: 'drive' method returns a string.")

print("\nAll assert tests passed. The corrected code is working as expected.")
```

```
Running the original buggy code to observe the error...

--- AI Debugging and Fix ---
Corrected output (start method): Car started
Corrected output (drive method): Car is driving

--- Assert Test Cases ---
Test Case 1 Passed: 'start' method works correctly.
Test Case 2 Passed: 'drive' method works correctly.
Test Case 3 Passed: 'drive' method returns a string.

All assert tests passed. The corrected code is working as expected.
```

Task Description #5 (TypeError – Mixing Strings and Integers in Addition)

Task: Provide code that adds an integer and string ("5" + 2) causing a TypeError. Use AI to resolve the bug.

```
# Bug: TypeError due to mixing string and integer
def add_five(value):
return value + 5
print(add_five("10"))
```

Requirements:

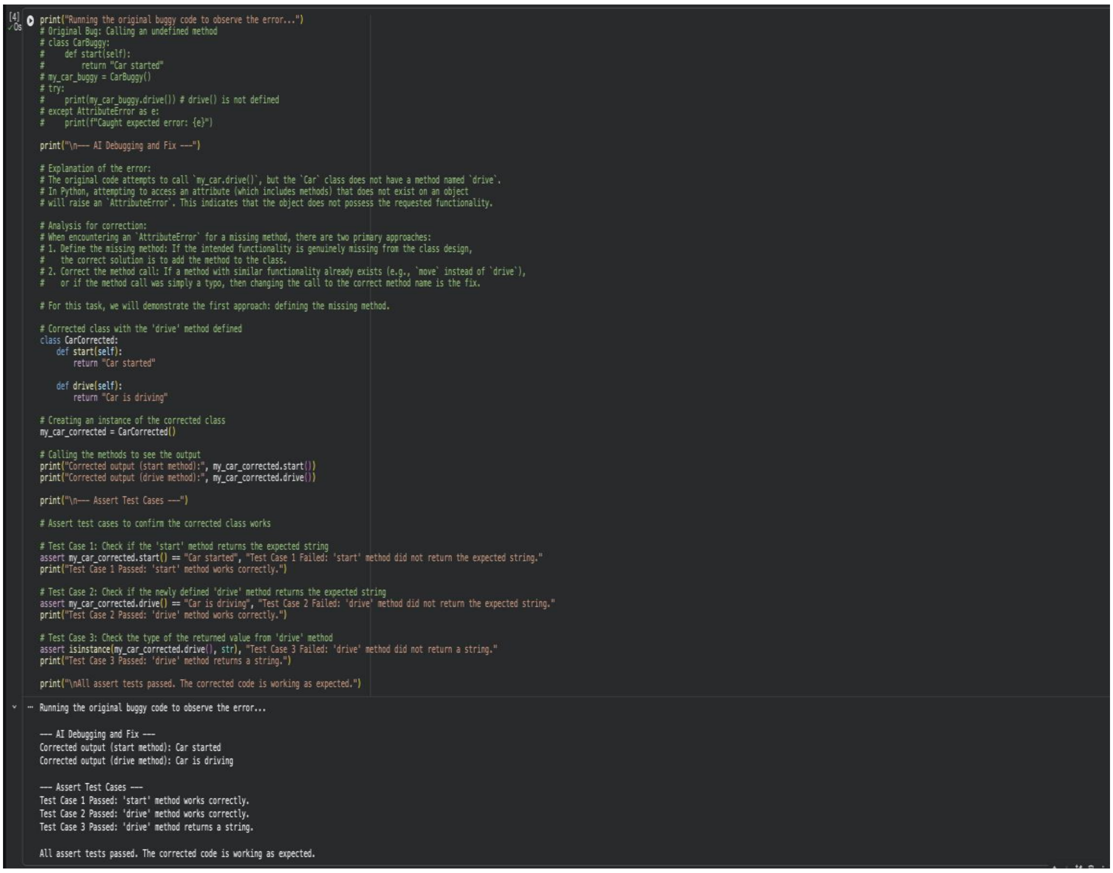
- Ask AI for two solutions: type casting and string concatenation.

- Validate with 3 assert test cases.

Expected Output #5:

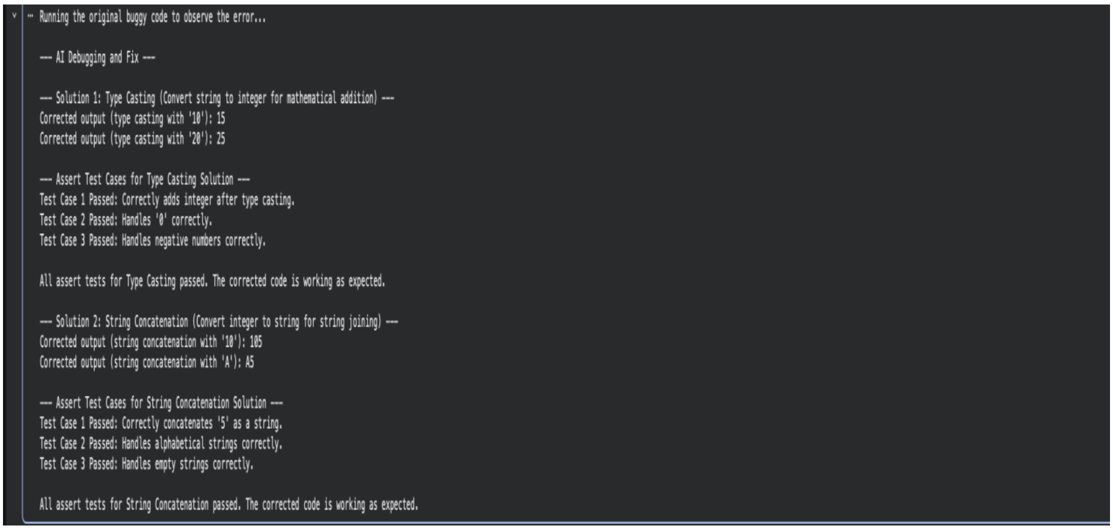
- Corrected code that runs successfully for multiple inputs.

Note: Report should be submitted a word document for all tasks in a single document with prompts, comments & code explanation, and output and if required, screenshots



```python
print("Running the original buggy code to observe the error...")
# Original Bug: Calling an undefined method
# class CarBuggy:
#     def start(self):
#         return "Car started"
# my_car_buggy = CarBuggy()
# try:
#     print(my_car_buggy.drive()) # drive() is not defined
# except AttributeError as e:
#     print(f"Caught expected error: {e}")

print("\n--- AI Debugging and Fix ---")

# Explanation of the error:
# The original code attempts to call `my_car.drive()`, but the `Car` class does not have a method named `drive`.
# In Python, attempting to access an attribute (which includes methods) that does not exist on an object
# will raise an `AttributeError`. This indicates that the object does not possess the requested functionality.

# Analysis for correction:
# When encountering an `AttributeError` for a missing method, there are two primary approaches:
# 1. Define the missing method: If the intended functionality is genuinely missing from the class design,
#    the correct solution is to add the method to the class.
# 2. Correct the method call: If a method with similar functionality already exists (e.g., `move` instead of `drive`),
#    or if the method call was simply a typo, then changing the call to the correct method name is the fix.

# For this task, we will demonstrate the first approach: defining the missing method.

# Corrected class with the 'drive' method defined
class CarCorrected:
    def start(self):
        return "Car started"

    def drive(self):
        return "Car is driving"

# Creating an instance of the corrected class
my_car_corrected = CarCorrected()

# Calling the methods to see the output
print("Corrected output (start method):", my_car_corrected.start())
print("Corrected output (drive method):", my_car_corrected.drive())

print("\n--- Assert Test Cases ---")

# Assert test cases to confirm the corrected class works

# Test Case 1: Check if the 'start' method returns the expected string
assert my_car_corrected.start() == "Car started", "Test Case 1 Failed: 'start' method did not return the expected string."
print("Test Case 1 Passed: 'start' method works correctly.")

# Test Case 2: Check if the newly defined 'drive' method returns the expected string
assert my_car_corrected.drive() == "Car is driving", "Test Case 2 Failed: 'drive' method did not return the expected string."
print("Test Case 2 Passed: 'drive' method works correctly.")

# Test Case 3: Check the type of the returned value from 'drive' method
assert isinstance(my_car_corrected.drive(), str), "Test Case 3 Failed: 'drive' method did not return a string."
print("Test Case 3 Passed: 'drive' method returns a string.")

print("\nAll assert tests passed. The corrected code is working as expected.")
```

```
Running the original buggy code to observe the error...

--- AI Debugging and Fix ---
Corrected output (start method): Car started
Corrected output (drive method): Car is driving

--- Assert Test Cases ---
Test Case 1 Passed: 'start' method works correctly.
Test Case 2 Passed: 'drive' method works correctly.
Test Case 3 Passed: 'drive' method returns a string.

All assert tests passed. The corrected code is working as expected.
```



```
Running the original buggy code to observe the error...

--- AI Debugging and Fix ---

--- Solution 1: Type Casting (Convert string to integer for mathematical addition) ---
Corrected output (type casting with '10'): 15
Corrected output (type casting with '20'): 25

--- Assert Test Cases for Type Casting Solution ---
Test Case 1 Passed: Correctly adds integer after type casting.
Test Case 2 Passed: Handles '0' correctly.
Test Case 3 Passed: Handles negative numbers correctly.

All assert tests for Type Casting passed. The corrected code is working as expected.

--- Solution 2: String Concatenation (Convert integer to string for string joining) ---
Corrected output (string concatenation with '10'): 105
Corrected output (string concatenation with 'A'): A5

--- Assert Test Cases for String Concatenation Solution ---
Test Case 1 Passed: Correctly concatenates '5' as a string.
Test Case 2 Passed: Handles alphabetical strings correctly.
Test Case 3 Passed: Handles empty strings correctly.

All assert tests for String Concatenation passed. The corrected code is working as expected.
```