AI Assisted Coding

Assignment 7.5

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Batch: 21

Lab 7: Error Debugging with AI: Systematic approaches to finding and fixing bugs Lab Objectives:

- To identify and correct syntax, logic, and runtime errors in Python programs using AI tools.
- To understand common programming bugs and AI-assisted debugging suggestions.
- To evaluate how AI explains, detects, and fixes different types of coding errors.
- To build confidence in using AI to perform structured debugging practices.

Lab Outcomes (LOs):

After completing this lab, students will be able to:

- Use AI tools to detect and correct syntax, logic, and runtime errors.
- Interpret AI-suggested bug fixes and explanations.

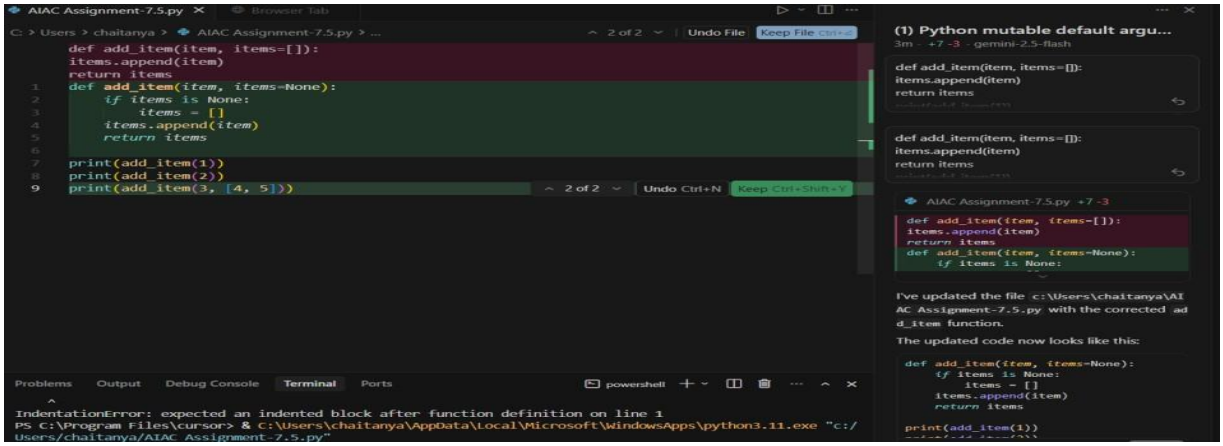
• Apply systematic debugging strategies supported by AI-generated insights.

Task 1 (Mutable Default Argument – Function Bug)

Task: Analyze given code where a mutable default argument cause unexpected behavior. Use AI to fix it. # Bug: Mutable default argument def add_item(item, items=[]): items.append(item) return items print(add_item(1)) print(add_item(2))

Expected Output: Corrected function avoids shared list bug.

Code:



Output:

To avoid this, a common practice is to use None as the default value and then create a new list inside the function if items is No

Observation:

The function safely handles mutable defaults by using None and creating a new list only when needed, ensuring each call uses an independent instance and preventing unintended shared state

Task 2 (Floating-Point Precision Error)

Task: Analyze given code where floating-point comparison fails.

Use AI to correct with tolerance. #

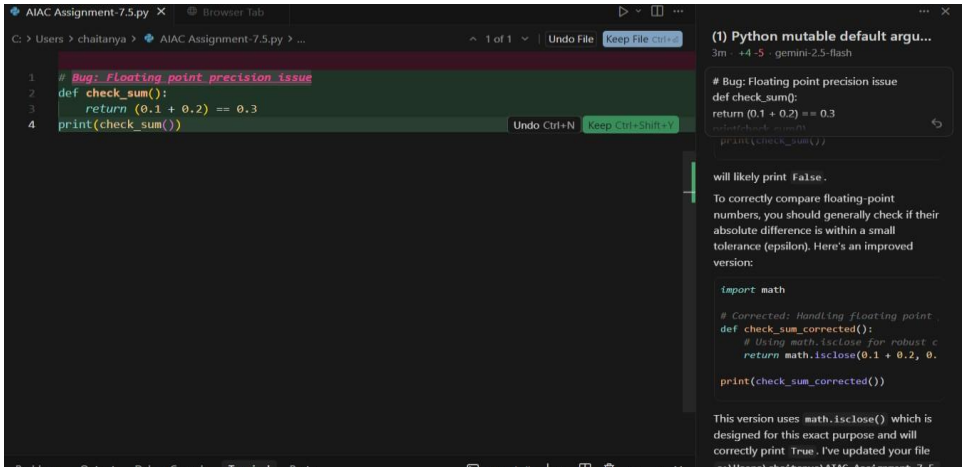
Bug: Floating point precision issue

def check_sum(): return (0.1 + 0.2)

== 0.3 print(check_sum())

Expected Output: Corrected function

Code:



Output:

To correctly compare floating-point numbers, you should generally check if their absolute difference is within a small tolerance (epsilon). Here's an improved version:

Observation:

The expression (0.1 + 0.2) == 0.3 typically evaluates to False because floating-point numbers cannot be represented exactly in binary. Values like 0.1 and 0.2 are stored as approximations, so their sum is slightly off from 0.3, causing a direct equality check to fail. The correct approach is to compare floats using a small tolerance, such as with math.isclose().

Task 3 (Recursion Error – Missing Base Case)

Task: Analyze given code where recursion runs infinitely due to missing base case. Use AI to fix.

Bug: No base case def

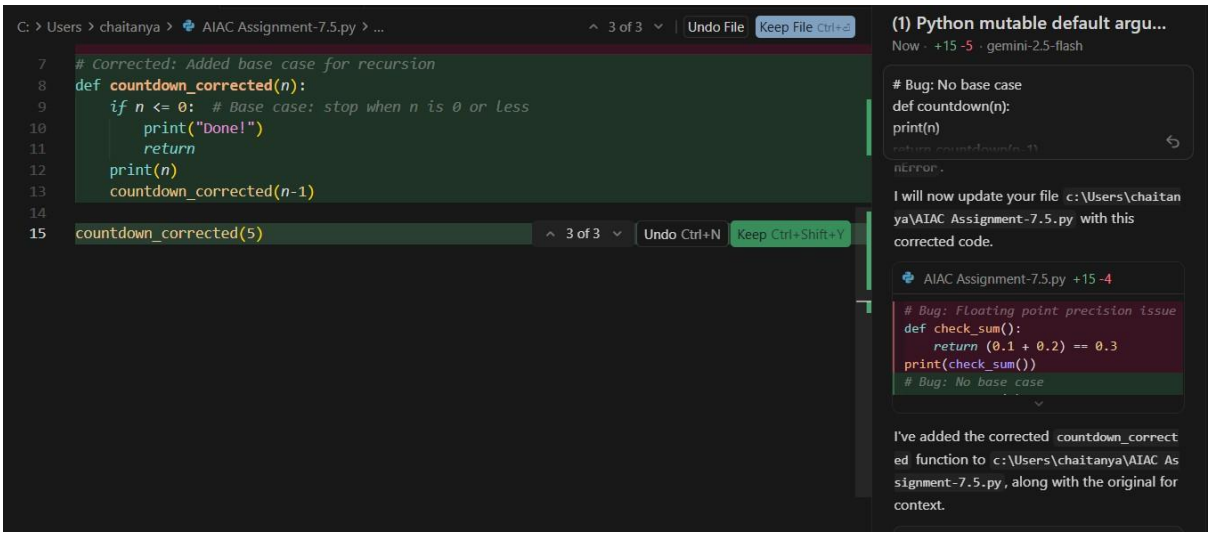
countdown(n):

print(n)

return countdown(n-1) countdown(5)

Expected Output : Correct recursion with stopping condition.

Code:



Output:

Observation:

The recursion error occurred because the function lacked a base case, causing infinite recursive calls and eventually a stack overflow. Adding a stopping condition that terminates when the value reaches zero fixed the issue and ensured the function executes correctly. This emphasizes the necessity of defining a base case in every recursive function.

Task 4 (Dictionary Key Error)

Task: Analyze given code where a missing dictionary key

causes error. Use AI to fix it.

Bug: Accessing non-existing key

def get_value(): data = {"a": 1, "b":

2} return data["c"]

print(get_value())

Expected Output: Corrected with .get() or error handling.

Code:

```python
# Task 4 (Dictionary Key Error)
'''
Task: Analyze given code where a missing dictionary key causes
error. Use AI to fix it.
# Bug: Accessing non-existing key
Expected Output: Corrected with .get() or error handling.
'''
def get_value():
    data = {"a": 1, "b": 2}
    return data["c"]
    return data.get("c", "Key not found")
print(get_value())
```

Output:

```
C:\Users\acera\Desktop\Btech_3_2\AI Assistant coding>python
Key not found
```

Observation:

The program attempted to access a non-existent dictionary key, resulting in a KeyError. Replacing direct key access with .get() or adding proper error handling prevented the crash and made the code more robust. This reinforces the need to validate keys before accessing them..

Task 5 (Infinite Loop – Wrong Condition)

Task: Analyze given code where loop never ends. Use AI to detect and fix it.

Bug: Infinite loop

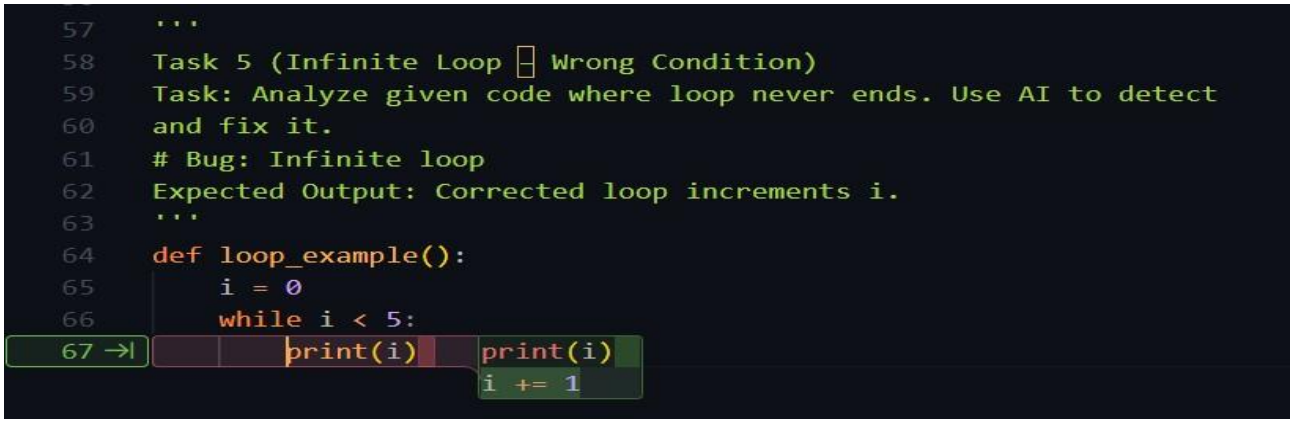
def loop_example():

i = 0 while i < 5:

print(i)

Expected Output: Corrected loop increments i.

Code:



Output:

Observation:

The infinite loop happened because the control variable i was never incremented inside the while loop, so the termination condition was never reached. Adding i += 1 allowed the loop to progress and exit correctly, preventing non-terminating execution.

Task 6 (Unpacking Error – Wrong Variables)

Task: Analyze given code where tuple unpacking fails. Use AI to fix

it.

Bug: Wrong unpacking

a, b = (1, 2, 3)

Expected Output: Correct unpacking or using _ for extra values.

Code:

```
71  # Task 6 (Unpacking Error - Wrong Variables)
72  '''
73  Task: Analyze given code where tuple unpacking fails. Use AI to
74  fix it.
75  # Bug: Wrong unpacking
76  Expected Output: Correct unpacking or using _ for extra values.
77  '''
78  a, b = (1, 2, 3)
    a, b, _ = (1, 2, 3)
```

Output:

```
C:\Users\acera\Desktop\Btech_3_2\AI Assistant coding>python
1 2
```

Observation:

The unpacking error occurred because the number of variables did not match the number of elements in the tuple. Matching the variable count or using placeholders like _ for unused values resolved the issue and ensured correct unpacking.

Task 7 (Mixed Indentation – Tabs vs Spaces)

Task: Analyze given code where mixed indentation breaks execution. Use AI to fix it. # Bug: Mixed indentation def func():

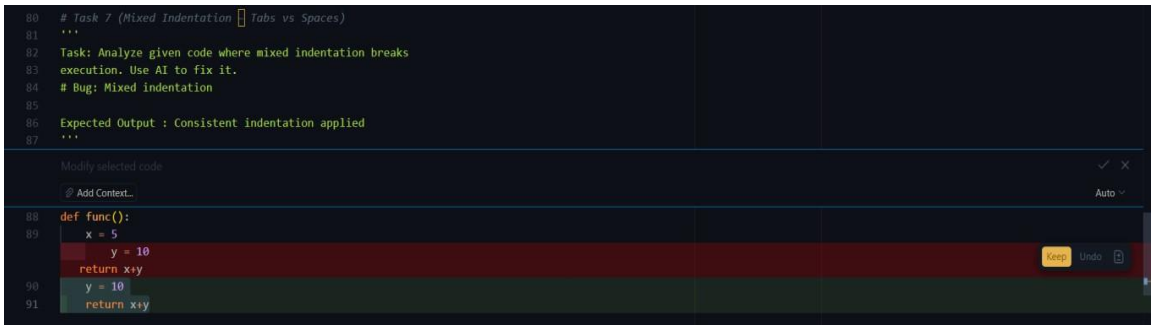
x = 5 y =

10

return x+y

Expected Output : Consistent indentation applied.

Code:



Output:

```
C:\Users\acera\Desktop\Btech_3_2\AI Assistant coding>python
15
```

Observation:

The error was caused by mixing tabs and spaces, which led to an IndentationError. Reformatting the code with consistent indentation—preferably four spaces—resolved the issue and ensured proper execution.

Task 8 (Import Error – Wrong Module Usage)

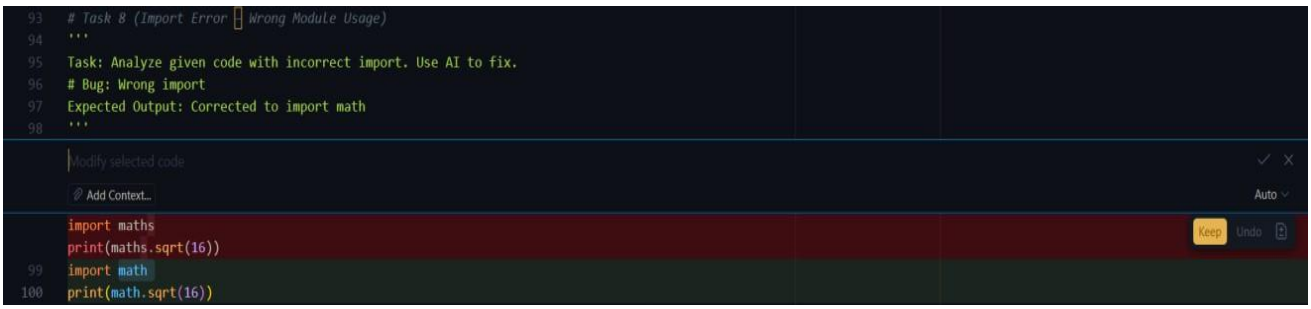
Task: Analyze given code with incorrect import. Use AI to fix.

Bug: Wrong import import

maths print(maths.sqrt(16))

Expected Output: Corrected to import math

Code:



Output:

```
C:\Users\acera\Desktop\Btech_3_2\AI Assistant coding>python
4.0
```

Observation:

The program tried to import a non-existent module maths, which raised a ModuleNotFoundError. Correcting the import to the built-in math module resolved the issue and allowed math.sqrt(16) to run successfully.

Observation:

- This lab involved identifying and fixing various Python errors, including logical, runtime, syntax, recursion, and import issues. The root causes were analyzed, such as mutable default arguments, floating-point precision limitations, and missing base cases in recursion. Corrective practices included tolerant float comparisons, safe dictionary access with .get(), proper loop control, and accurate tuple unpacking..

- Overall, the lab improved our systematic debugging approach and increased confidence in using AI for structured and efficient error correction.