AI ASSISTED CODING

ASSIGNMENT-7.5

HALLTICKET NO: 2303A52438

BATCH: 45

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 Week4 - Monday 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.

Refactor buggy code using responsible and reliable programming patterns.

Task 1 (Mutable Default Argument – Function Bug)

Task: Analyze given code where a mutable default argument causes

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.

Prompt:

def add_item(item, items=[]):

items.append(item)

return items

print(add_item(1))

print(add_item(2)) debug the code

Code:

ai assisted coding lab 7.5.py > add_item

```
#task1
def add_item(item, items=None):
    if items is None:
        items = []
    items.append(item)
    return items

print(add_item(1))        # [1]
print(add_item(2))        # [2]
print(add_item(3, [10]))  # [10, 3]

```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/L
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
[1]
[2]
[10, 3]
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

The bug happens because the same list is reused every time the function is called. By using None and creating a new list inside the function, each call gets a fresh list. This prevents unexpected shared data.

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

Prompt:

def check_sum():

return (0.1 + 0.2) == 0.3

print(check_sum())

fix the code where the floating comparison fails

Code:

```
#task2
import math

def check_sum():
    return math.isclose(0.1 + 0.2, 0.3, rel_tol=1e-9, abs_tol=0.0)

print(check_sum())  # True
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Local
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
True
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Floating-point numbers are not stored exactly in memory, which causes direct comparisons to fail. Using a small tolerance helps compare values safely and gives accurate logical results.

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.

Prompt:

def countdown(n):

print(n)

return countdown(n-1)

countdown(5)

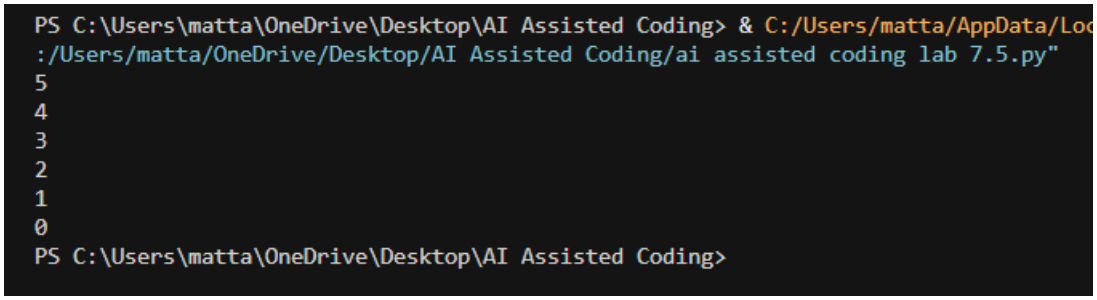
fix **the recursion error**

Code:

```
#task3
def countdown(n):
    if n <= 0:
        print(0)
        return
    print(n)
    return countdown(n - 1)

countdown(5)
```

Output:



Justification:

Without a base case, the function keeps calling itself forever. Adding a stopping condition ensures the recursion ends properly and avoids stack overflow errors.

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.

Prompt:

def get_value():

data = {"a": 1, "b": 2}

return data["c"]

print(get_value())

fix the dictionary key with .get()

Code:

```python

#task4
def get_value():
    data = {"a": 1, "b": 2}
    return data.get("c", 0)  # default 0 if "c" not present

print(get_value())
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Local/
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
0
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Accessing a key that doesn't exist causes a runtime error. Using .get() safely handles missing keys and prevents the program from crashing.

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.

Prompt:

def loop_example():

i = 0

while i < 5:

print(i)

fix the infinite loop

Code:

```
38
39  #task5
40  def loop_example():
41      i = 0
42      while i < 5:
43          print(i)
44          i += 1
45
46  loop_example()
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Loc
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
0
1
2
3
4
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

The loop never ends because the counter variable is never updated. Incrementing the variable inside the loop allows the condition to eventually fail and stop 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.

Prompt:

a, b = (1, 2, 3)

fix the unpacking error and get values

Code:

```
47
48  #task6
49  a, b, c = (1, 2, 3)
50  print(a, b, c)
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Local/
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
1 2 3
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

The error occurs because there are more values than variables to unpack. Using an underscore or matching variable count correctly fixes the issue cleanly.

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.

Prompt:

def func():

x = 5

y = 10

return x+y fix the indentation error

Code:

```python
#task7
def func():
    x = 5
    y = 10
    return x + y

print(func())
```

Output:

```
PS C:\Users\matta& C:/Users/matta/AppData/Local/Programs/Python/
sted Coding/ai assisted coding lab 7.5.py"
15
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Python relies on consistent indentation for code blocks. Fixing the indentation using spaces throughout ensures the code runs without syntax errors.

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

Prompt:

import maths

print(maths.sqrt(16)) fix the incorrect import

Code:

```python
#task8
import math

print(math.sqrt(16))
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Loc
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
4.0
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

The module name was incorrect, leading to an import failure. Correcting the module name allows Python to access the required functions properly.

Task 9 (Unreachable Code – Return Inside Loop)

Task: Analyze given code where a return inside a loop prevents full iteration. Use AI to fix it.

Bug: Early return inside loop

def total(numbers):

for n in numbers:

return n

print(total([1,2,3]))

Expected Output: Corrected code accumulates sum and returns after loop.

Prompt:

def total(numbers):

for n in numbers:

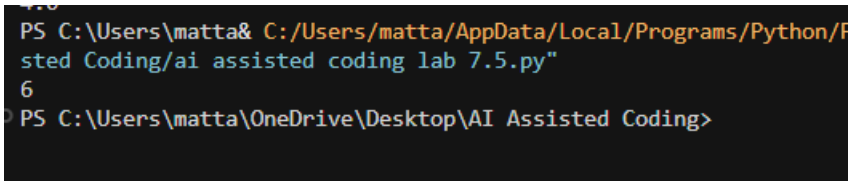
return n

print(total([1,2,3])) fix the return inside a loop

Code:

```
64
65  #task9
66  def total(numbers):
67      s = 0
68      for n in numbers:
69          s += n
70      return s
71
72  print(total([1, 2, 3]))  # 6
```

Output:



Justification:

Returning inside the loop exits the function after the first iteration. Moving the return statement outside the loop ensures all values are processed.

Task 10 (Name Error – Undefined Variable)

Task: Analyze given code where a variable is used before being defined. Let AI detect and fix the error.

Bug: Using undefined variable

def calculate_area():

return length * width

print(calculate_area())

Requirements:

• Run the code to observe the error.

• Ask AI to identify the missing variable definition.

• Fix the bug by defining length and width as parameters.

• Add 3 assert test cases for correctness.

Expected Output :

• Corrected code with parameters.

• AI explanation of the bug.

Successful execution of assertions

Prompt:

def calculate_area():

return length * width

print(calculate_area()) fix the name error with 3 test cases

Code:

```
#task10
def calculate_area(length, width):
    return length * width

# Test cases
print(calculate_area(5, 3))   # 15
print(calculate_area(10, 2))  # 20
print(calculate_area(7, 4))   # 28
```

Output:

```
PS C:\Users\matta& C:/Users/matta/AppData/Local/Programs/Pyth
sted Coding/ai assisted coding lab 7.5.py"
15
20
28
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

The variables were used without being defined. Passing them as function parameters makes the function reusable and removes the name error.

Task 11 (Type Error – Mixing Data Types Incorrectly)

Task: Analyze given code where integers and strings are added incorrectly. Let AI detect and fix the error.

Bug: Adding integer and string

def add_values():

return 5 + "10"

print(add_values())

Requirements:

• Run the code to observe the error.

• AI should explain why int + str is invalid.

• Fix the code by type conversion (e.g., int("10") or str(5)).

• Verify with 3 assert cases.

Expected Output #6:

• Corrected code with type handling.

• AI explanation of the fix.

Successful test validation.

Prompt:

def add_values():

return 5 + "10"

print(add_values()) fix the type error with 3 test cases

Code:

```
#task11
def add_values(a, b):
    # Convert both to integers before adding
    return int(a) + int(b)

# 3 test cases
print(add_values(5, "10"))   # 15
print(add_values("3", "7"))  # 10
print(add_values(0, "0"))    # 0
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Local/
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
15
10
0
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Python does not allow adding integers and strings directly. Converting one type to match the other ensures valid operations and correct output.

Task 12 (Type Error – String + List Concatenation)

Task: Analyze code where a string is incorrectly added to a list.

Bug: Adding string and list

def combine():

  return "Numbers: " + [1, 2, 3]

print(combine())

Requirements:

• Run the code to observe the error.

• Explain why str + list is invalid.

• Fix using conversion (str([1,2,3]) or " ".join()).

• Verify with 3 assert cases.

Expected Output:

• Corrected code

• Explanation

• Successful test validation

Prompt:

def combine():

return "Numbers: " + [1, 2, 3]

print(combine())

fix the type error with 3 testcases

Code:

```
92
93  #task12
94  def combine(numbers):
95      # Convert the list of numbers to a comma-separated string
96      return "Numbers: " + ", ".join(str(n) for n in numbers)
97
98  # 3 test cases
99  print(combine([1, 2, 3]))        # Numbers: 1, 2, 3
00  print(combine([10, 20, 30]))     # Numbers: 10, 20, 30
01  print(combine([]))               # Numbers:
```

Output:

```
PS C:\Users\matta& C:/Users/matta/AppData/Local/Programs/Python/Python313/python.
sted Coding/ai assisted coding lab 7.5.py"
Numbers: 1, 2, 3
Numbers: 10, 20, 30
Numbers:
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Strings and lists cannot be concatenated directly. Converting the list to a string or joining its elements resolves the type mismatch.

Task 13 (Type Error – Multiplying String by Float)

Task: Detect and fix code where a string is multiplied by a float.

Bug: Multiplying string by float

```
def repeat_text():
  return "Hello" * 2.5
print(repeat_text())
```

Requirements:

• Observe the error.

• Explain why float multiplication is invalid for strings.

• Fix by converting float to int.

• Add 3 assert test cases.

Prompt:

def repeat_text():

return "Hello" * 2.5

print(repeat_text()) fix the typeerror with 3 examples

Code:

```python
#task13
def repeat_text(text, times):
    # Ensure times is an integer to avoid TypeError
    return text * int(times)

# 3 examples
print(repeat_text("Hello", 2.5))  # HelloHello
print(repeat_text("Hi", 3))       # HiHiHi
print(repeat_text("Bye", 1.2))    # Bye
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppDa
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.
HelloHello
HiHiHi
Bye
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Strings can only be multiplied by integers, not floats. Converting the float to an integer makes repetition valid and predictable.

Task 14 (Type Error – Adding None to Integer)

Task: Analyze code where None is added to an integer.

Bug: Adding None and integer

def compute():

value = None

return value + 10

print(compute())

Requirements:

• Run and identify the error.

• Explain why NoneType cannot be added.

• Fix by assigning a default value.

• Validate using asserts.

Prompt:

def compute():

value = None

return value + 10

print(compute()) fix the type error with 3 testcases

Code:

```
112
113  #task14
114  def compute(value=None):
115      # If value is None, treat it as 0
116      if value is None:
117          value = 0
118      return value + 10
119
120  # 3 test cases
121  print(compute())      # 10
122  print(compute(5))     # 15
123  print(compute(-3))    # 7
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Loc
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
10
15
7
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

None represents the absence of a value and cannot be used in arithmetic. Assigning a default numeric value prevents runtime errors.

Task 15 (Type Error – Input Treated as String Instead of Number)

Task: Fix code where user input is not converted properly.

Bug: Input remains string

def sum_two_numbers():

a = input("Enter first number: ")

b = input("Enter second number: ")

return a + b print(sum_two_numbers())

Requirements:

• Explain why input is always string.

• Fix using int() conversion.

• Verify with assert test cases.

Prompt:

def sum_two_numbers():

a = input("Enter first number: ")

b = input("Enter second number: ")

return a + b

print(sum_two_numbers()) fix the input error with 3 test cases

Code:

```
#task15
def sum_two_numbers(a, b):
    return int(a) + int(b)

# 3 test cases
print(sum_two_numbers("2", "3"))    # 5
print(sum_two_numbers("10", "20"))  # 30
print(sum_two_numbers(7, "8"))      # 15
```

Output:

```
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding> & C:/Users/matta/AppData/Local/Programs/Python/Pyt
:/Users/matta/OneDrive/Desktop/AI Assisted Coding/ai assisted coding lab 7.5.py"
5
30
15
PS C:\Users\matta\OneDrive\Desktop\AI Assisted Coding>
```

Justification:

Python’s input() always returns a string by default. Converting inputs to integers allows correct numerical addition instead of string concatenation.