ASSIGNMENT-7.4

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

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.

```
##1
def add_item(item, items=None):
    if items is None:
        items = []
    items.append(item)
    return items

print(add_item(1))
print(add_item(2))
```

OUTPUT:

[1]

[2]

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

```
##2
def check_sum():
    return abs((0.1 + 0.2) - 0.3) < 1e-9

print(check_sum())
```

OUTPUT:

True

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.

```python
##3
def countdown(n):
    if n < 0:
        return
    print(n)
    countdown(n - 1)
countdown(5)
```

OUTPUT:

5

4

3

2

1

0

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.

```python
##4
def get_value():
    data = {"a":1, "b":2}
    return data.get("c", "Default Value")
print(get_value())
```

OUTPUT:

Default Value

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.

```python
##5


def loop_example():
    i = 0
    while i < 5:
        print(i)
        i += 1

loop_example()
```

OUTPUT:

0

1

2

3

4

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.

```
##6
a,b,c = 1,2,3
print(a,b,c)
```

OUTPUT:

1 2 3

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.

```python
##7
def fun():
    x=5
    y=10
    return x+y
result = fun()
print(result)
```

OUTPUT:

15

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

```python
##8
import math
print(math.sqrt(16))
```

OUTPUT:

4.0

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):

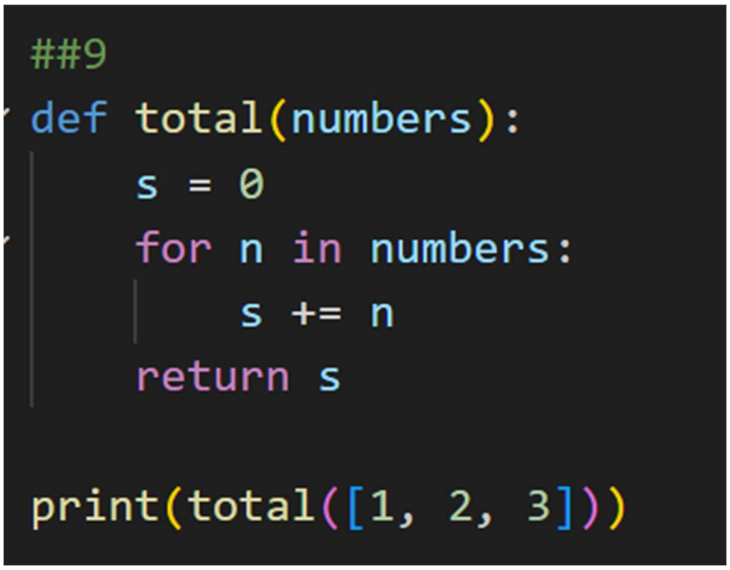
for n in numbers:

return n

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

Expected Output: Corrected code accumulates sum and returns

after loop.



```
##9
def total(numbers):
    s = 0
    for n in numbers:
        s += n
    return s

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

OUTPUT:

6

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.

```
##10


def calculate_area(length, width):
    return length * width

assert calculate_area(5, 10) == 50
assert calculate_area(7, 3) == 21
assert calculate_area(0, 100) == 0

print(calculate_area(5,10))
```

OUTPUT:

50

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.

```
##11
def add_values():
    return 5 + int("10")

assert add_values() == 15
assert 5 + int("20") == 25
assert 10 + int("30") == 40

print(add_values())
```

OUTPUT:

15

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

```
##12
def combine():
    return "Numbers: " + str([1, 2, 3])

assert combine() == "Numbers: [1, 2, 3]"
assert "Numbers: " + str([4, 5]) == "Numbers: [4, 5]"
assert "Numbers: " + str([]) == "Numbers: []"

print(combine())
```

OUTPUT:

Numbers: [1, 2, 3]

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.

```python
##13
def repeat_text():
    return "Hello" * int(2.5)

assert repeat_text() == "HelloHello"
assert "Hi" * int(3.7) == "HiHiHi"
assert "Bye" * int(1.2) == "Bye"

print(repeat_text())
```

OUTPUT:

HelloHello

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.

```python
##14
def compute():
    value = None
    if value is None:
        value = 0
    return value + 10

assert compute() == 10
assert (None if False else 0) + 5 == 5
assert (0 + 20) == 20

print(compute())
```

OUTPUT:

10

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.

```python
##15
def sum_two_numbers():
    a = int(input("Enter first number: "))
    b = int(input("Enter second number: "))
    return a + b

assert (lambda: int("5") + int("10"))() == 15
assert (lambda: int("7") + int("3"))() == 10
assert (lambda: int("100") + int("200"))() == 300

print(sum_two_numbers())
```

OUTPUT:

Enter first number: 11

Enter second number: 98

109