

## ASSIGNMENT-7.3

(Error Debugging with AI: Systematic approaches to finding and fixing bugs)

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BATCH NO:27

### Task 1: Fixing Syntax Errors

#### Scenario

You are reviewing a Python program where a basic function definition contains a syntax error.

#### Requirements

- Provide a Python function `add(a, b)` with a missing colon
- Use an AI tool to detect the syntax error
- Allow AI to correct the function definition
- Observe how AI explains the syntax issue

#### Expected Output

- Corrected function with proper syntax
- Syntax error resolved successfully
- AI-generated explanation of the fix

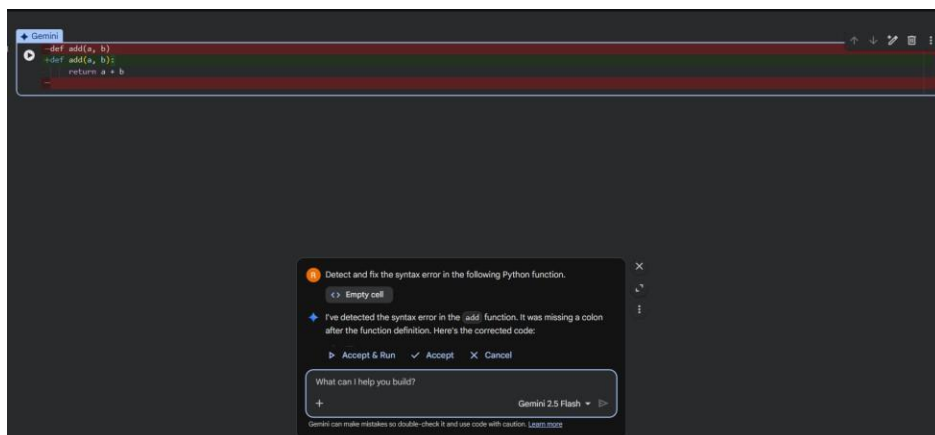
#### Prompt:

“Detect and fix the syntax error in the following Python function”

#### Buggy Code

```
def add(a, b)
    return a + b
```

#### AI-Detected Issue



- Missing colon (:) at the end of the function definition.

### Corrected code:

```
[1] def add(a, b):  
    return a + b
```

### Explanation

- In Python, a colon is mandatory after function definitions.
- Without the colon, Python raises a `SyntaxError`.
- Adding the colon fixes the syntax issue and allows the function to execute properly.

## Task 2: Debugging Logic Errors in Loops

### Scenario

You are debugging a loop that runs infinitely due to a logical mistake.

### Requirements

- Provide a loop with an increment or decrement error
- Use AI to identify the cause of infinite iteration
- Let AI fix the loop logic
- Analyze the corrected loop behavior

### Expected Output

- Infinite loop issue resolved
- Correct increment/decrement logic applied
- AI explanation of the logic error

### Prompt:

“Identify and fix the logical error causing an infinite loop.”

### Buggy Code

```
def count_down(n):  
    while n >= 0:  
        print(n)  
        n += 1 # Should be n -= 1
```

### AI-Detected Issue

```
[3] def count_down(n):  
    while n >= 0:  
        print(n)  
        n += 1 # Should be n -= 1  
...  
File "/tmp/ipython-input-4228571664.py", line 4  
    n += 1 # Should be n -= 1  
    ^  
IndentationError: unexpected indent  
Next steps: Explain error
```

- IndentationError: unexpected indent
- The loop control variable `n` is **incremented instead of decremented**.
- Since the condition is `n >= 0`, increasing `n` makes the condition always true.
- This results in an **infinite loop**.

### Corrected Code:

```
[3] def count_down(n):  
    while n >= 0:  
        print(n)  
        n -= 1
```

◆ The error `IndentationError: unexpected indent` means that a line of code was improperly indented, which is syntactically incorrect in Python. Specifically, it seems the line `n += 1` was indented too much. The error message also correctly suggested that for a countdown, `n` should be decremented, not incremented. However, inspecting the current code in the

[Show an example of using the add function](#) [Add docstrings to the add function](#) [How ca](#)

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### Explanation:

- The loop is intended to count down from `n` to 0.
- However, incrementing `n` prevents the loop from reaching the terminating condition.
- AI identified that decrementing `n` allows the loop condition to eventually become false.
- This correction stops the infinite execution.

### Task 3: Handling Runtime Errors (Division by Zero)

#### Scenario

A Python function crashes during execution due to a division by zero error.

#### Requirements

- Provide a function that performs division without validation
- Use AI to identify the runtime error
- Let AI add try-except blocks for safe execution
- Review AI's error-handling approach

#### Expected Output

- Function executes safely without crashing
- Division by zero handled using try-except
- Clear AI-generated explanation of runtime error handling

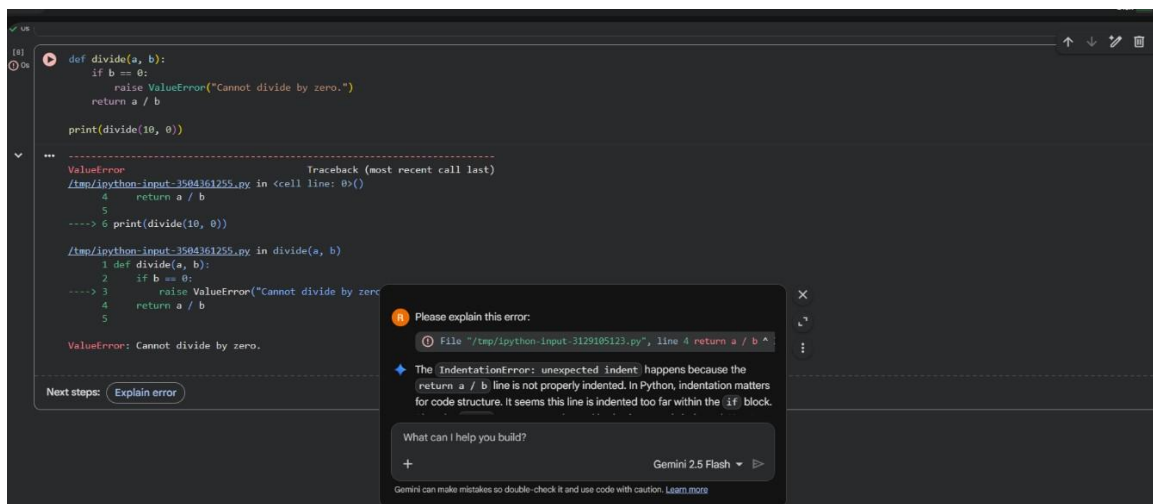
#### Prompt:

"Identify the runtime error and modify the code to prevent program crash"

#### Buggy Code

```
def divide(a, b):  
    return a / b  
  
print(divide(10, 0))
```

#### AI-Detected Issue



- Division by zero causes a ZeroDivisionError.

### Corrected code:

```
def divide(a, b):  
    if b == 0:  
        raise ValueError("Cannot divide by zero.")  
    return a / b  
  
print(divide(10, 2))  
5.0
```

### Explanation:

- AI identified that the runtime crash occurs due to division by zero.
- It added a **validation check** before performing division.
- Raising a ValueError prevents unsafe execution and clearly informs the user.
- This approach ensures safer and more predictable program behavior.

## Task 4: Debugging Class Definition Errors

### Scenario

You are given a faulty Python class where the constructor is incorrectly defined.

### Requirements

- Provide a class definition with missing self-parameter
- Use AI to identify the issue in the `__init__()` method
- Allow AI to correct the class definition
- Understand why self is required

### Expected Output

- Corrected `__init__()` method
- Proper use of self in class definition
- AI explanation of object-oriented error

### Prompt:

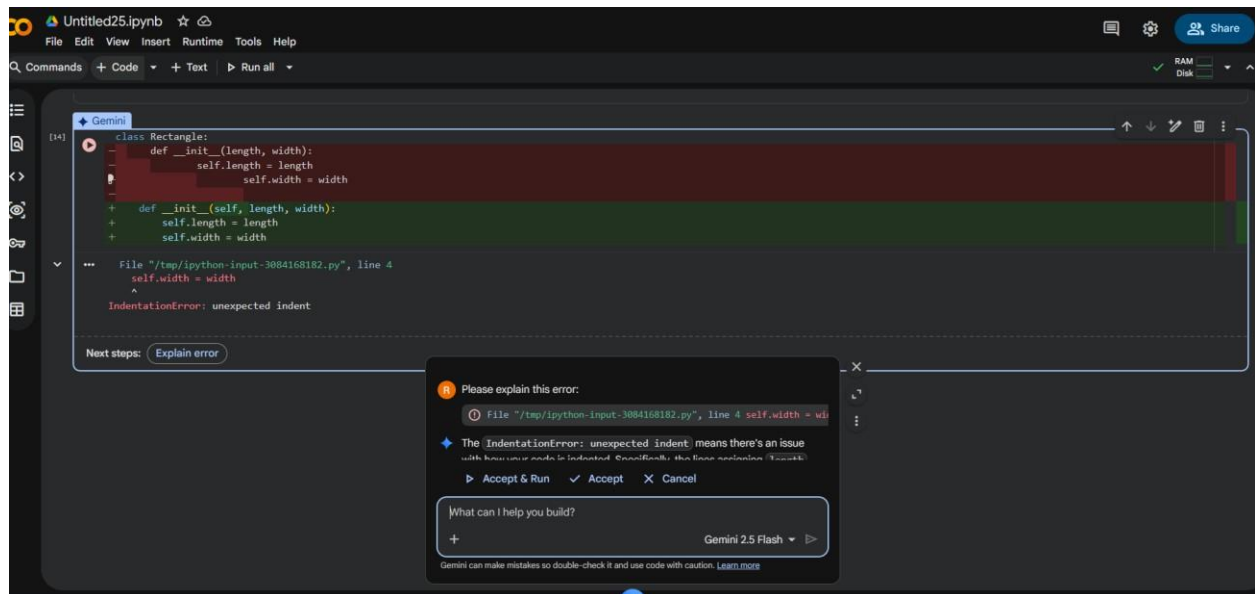
"Identify the issue in the class constructor and correct it"

### Buggy Code

class Student:

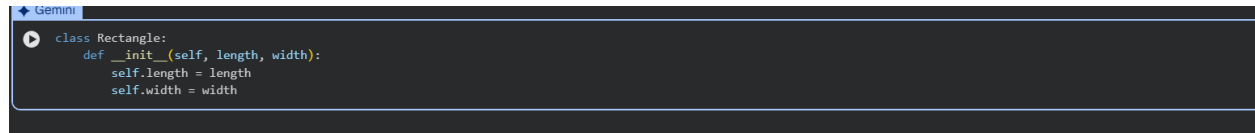
```
    def __init__(name, roll):  
        name = name  
        roll = roll
```

## AI-Detected Issue



- Missing self parameter in the constructor.
- Instance variables are not properly assigned.

## Corrected Code:



## Explanation:

- self is mandatory in instance methods to access object data.
- AI identified that length and width must be associated with the object.
- Adding self allows proper initialization of instance variables.

## Task 5: Resolving Index Errors in Lists

### Scenario

A program crashes when accessing an invalid index in a list.

### Requirements

- Provide code that accesses an out-of-range list index
- Use AI to identify the Index Error
- Let AI suggest safe access methods
- Apply bounds checking or exception handling

### Expected Output

- Index error resolved
- Safe list access logic implemented

### Prompt:

“Identify the index error and suggest a safe access method.”

### Buggy Code

```
numbers = [1, 2, 3]
print(numbers[5])
```

### AI-Detected Issue



```
1 numbers = [1, 2, 3]
2 print(numbers[5])

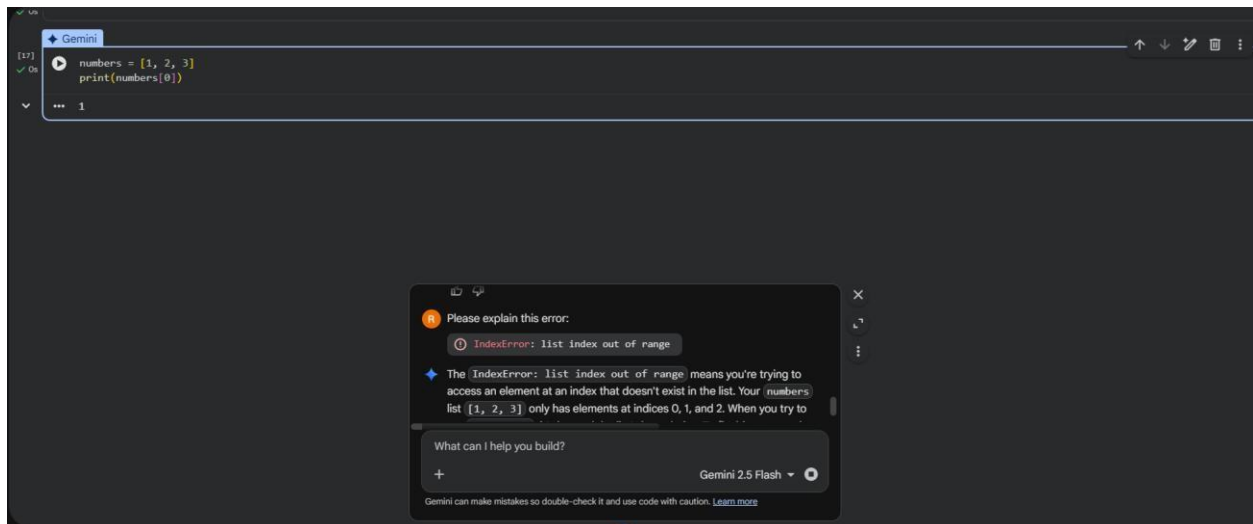
***
IndexError                                Traceback (most recent call last)
/tmp/jupyter-input-3953365294.py in <cell line: 0>()
      1 numbers = [1, 2, 3]
----> 2 print(numbers[5])

IndexError: list index out of range

Next steps: Explain error
```

- Index 5 does not exist in the list.
- Causes IndexError.

### Corrected code:



```
1 numbers = [1, 2, 3]
2 print(numbers[0])

*** 1
```

Please explain this error:

`IndexError: list index out of range`

The `IndexError: list index out of range` means you're trying to access an element at an index that doesn't exist in the list. Your `numbers` list `[1, 2, 3]` only has elements at indices 0, 1, and 2. When you try to

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### Explanation:

- List indices must be within the range of list length.
- Checking bounds prevents runtime errors.

