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**Batch : 51**

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

### Task 1 – Runtime Error Due to Invalid Input Type

**Prompt:** Write a Python function to determine whether a given number is prime.

**Code :**

The screenshot shows a code editor interface with a dark theme. At the top, there are tabs for "Welcome", "day.py", "AI.py", and "7.2.py". The "7.2.py" tab is active. Below the tabs, the code is displayed in a code editor window:

```
1 num = input("Enter a number: ")
2 result = num + 10 num = '5'
```

A red arrow points to the line "result = num + 10 num = '5'". A tooltip or status bar at the bottom of the code editor displays the error message:

Exception has occurred: TypeError  
can only concatenate str (not "int") to str  
File "C:\Users\girug\Downloads\AI\7.2.py", line 2, in <module>  
 result = num + 10  
 ^~~~~~  
TypeError: can only concatenate str (not "int") to str

## Output:

The screenshot shows the VS Code interface. At the top, there are tabs for 'Welcome', 'day.py', 'AI.py', and '7.2.py'. The '7.2.py' tab is active, displaying the following code:

```
1 num = int(input("Enter a number: "))
2 result = num + 10
3 print(result)
4
```

Below the code editor is a terminal window. The terminal tab is selected, showing the following command-line interaction:

```
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> ^C
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> c:;
cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '--' 'c:\Users\girug\Downloads\AI\7.2.py'
Enter a number: 6
16
PS C:\Users\girug\Downloads\AI>
```

**Justification:** The program failed because `input()` returns data as a string, and adding a string to an integer is invalid in Python. The AI corrected this by converting the input to an integer using `int()`, ensuring the arithmetic operation works properly. This type conversion is necessary to match the expected numeric behavior of the program.

## Task 2 – Incorrect Function Return Value

### Prompt:

Generate a function to calculate the sum of elements in a list.

## Code :

```
23
24
25
26
27
28 def square(n):
29     result = n * n
30
31
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS

PS C:\Users\girug\Downloads\AI> c::; cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.14.64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '51096' '--' 'C:\Users\girug\Downloads\AI\7.2.py'
PS C:\Users\girug\Downloads\AI> 6
6
PS C:\Users\girug\Downloads\AI> []
```

## Output:

```
24
25
26
27 def square(n):
28     result = n * n
29     return result
30 print(square(8))
31

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS

> c::; cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '638' '--' 'C:\Users\girug\Downloads\AI\7.2.py'
25
PS C:\Users\girug\Downloads\AI> ^C
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> c::; cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '639' '--' 'C:\Users\girug\Downloads\AI\7.2.py'
PS C:\Users\girug\Downloads\AI> 8^C
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> c::; cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '502' '--' 'C:\Users\girug\Downloads\AI\7.2.py'
64
PS C:\Users\girug\Downloads\AI> []
```

In 30 Col 15

## Justification:

Although the function computed the square internally, it never returned the result, causing the output to be lost. The AI identified the missing return statement and added it, allowing the function to properly

send the computed value back to the caller. Returning values is essential for functional correctness and reusability.

### Task 3 – IndexError in List Traversal

Write a Python function that takes an alphanumeric string and returns only the digits.

**Code :**

The screenshot shows a code editor in VS Code with a dark theme. A Python script is open, and the cursor is at line 33. The code is as follows:

```
1, 20...
25
26
27
28
29
30
31     numbers = [10, 20, 30]
32 → for i in range(0, len(numbers)+1):
33     print(numbers[i]) numbers = [10, 20, 30], i = 3
```

An error message box is displayed, showing:

Exception has occurred: IndexError  
list index out of range  
File "C:\Users\girug\Downloads\AI\7.2.py", line 33, in <module>  
 print(numbers[i])  
 ^^^  
IndexError: list index out of range

The status bar at the bottom shows "PROBLEMS", "OUTPUT", "DEBUG CONSOLE", "TERMINAL", and "PORTS". The terminal tab is selected, showing the command "python 7.2.py".

**Output:**

The screenshot shows the terminal tab in VS Code. The command "python 7.2.py" is run, and the output is:

```
10
20
30
```

The status bar at the bottom shows "PROBLEMS", "OUTPUT", "DEBUG CONSOLE", "TERMINAL", and "PORTS". The terminal tab is selected, showing the command "python 7.2.py".

**Justification:**

The loop incorrectly iterated one step beyond the valid index range using `len(numbers) + 1`, causing an `IndexError`. AI fixed the boundary to `range(len(numbers))`, ensuring safe access of all existing list elements. This correction is justified because valid indices only go from 0 to `len(numbers)-1`.

## Task 4 – Uninitialized Variable Usage

### Prompt :

Write a Python function to count the number of vowels in a given string.

### Code :

A screenshot of a code editor showing a Python script named 7.2.py. The code contains a single line: `print(total)`. A yellow box highlights this line, and a tooltip displays the error message: "Exception has occurred: NameError × name 'total' is not defined". Below the code editor, the terminal output shows the same error message: "NameError: name 'total' is not defined".

```
54
55
56
57 if True:
58 | pass
D 59 print(D total)
Exception has occurred: NameError ×
name 'total' is not defined
File "c:\Users\girug\Downloads\AI\7.2.py", line 59, in <module>
    print(total)
           ^
NameError: name 'total' is not defined
'total' ...
59:7
60
61
62
```

### Output:

A screenshot of a code editor showing the same Python script 7.2.py. This time, the code includes an initialization line: `total = 0 # Initializing the variable`. The terminal output shows the command `python 7.2.py` being run, and the output is `0`, indicating the program ran successfully. The status bar at the bottom right shows "Ln 79, Col 1 Spaces: 4 UTF-8".

```
77
78
79
80 total = 0 # Initializing the variable
81 if True:
82 | pass
83
84 print(total)
85
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
+ v ... |
... 'C:\Users\girug\Downloads\AI\7.2.py'
PS C:\Users\girug\Downloads\AI> ^C
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> c:; cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.14-64\python.exe' 'c:\Users\girug\vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '63589'
'--' 'C:\Users\girug\Downloads\AI\7.2.py'
0
PS C:\Users\girug\Downloads\AI> []
Ln 79, Col 1 Spaces: 4 UTF-8
```

### Justification:

The program attempted to print a variable (total) before it had been assigned any value, resulting in a runtime error. AI resolved this by initializing the variable to 0 before use, ensuring the program has a valid reference. Proper initialization prevents undefined behavior and is a fundamental programming requirement.

## Task 5 – Logical Error in Student Grading System

### Prompt :

write a Python function that takes three numbers and returns the minimum value without using min().

## Code :

The screenshot shows the VS Code interface with the terminal tab selected. The code editor contains the following Python script:

```
79     marks = 85
80     if marks >= 90:
81         grade = "A"
82     elif marks >= 80:
83         grade = "C"
84     else:
85         grade = "B"
86     print(grade)
87
88
89
90
91
92
```

The terminal window shows the following output:

```
PS C:\Users\girug\Downloads\AI> ^C
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> c:;
cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.14-64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '50305'
'--' 'C:\Users\girug\Downloads\AI\7.2.py'
C
PS C:\Users\girug\Downloads\AI>
```

## Output:

The screenshot shows the VS Code interface with the terminal tab selected. The code editor contains the same Python script as before. The terminal window shows the following output:

```
74
75
76
77
78
79     marks = 85
80
81     if marks >= 90:
82         grade = "A"
83     elif marks >= 80:
84         grade = "B"
85     else:
86         grade = "C"
87
88     print(grade)
89
```

The terminal window shows the following output:

```
C
PS C:\Users\girug\Downloads\AI> ^C
PS C:\Users\girug\Downloads\AI>
PS C:\Users\girug\Downloads\AI> c;;
cd 'c:\Users\girug\Downloads\AI'; & 'c:\Users\girug\AppData\Local\Python\pythoncore-3.14-64\python.exe' 'c:\Users\girug\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '64291'
'--' 'C:\Users\girug\Downloads\AI\7.2.py'
B
PS C:\Users\girug\Downloads\AI>
```

## Justification:

The conditions for assigning grades were incorrectly ordered, making the program assign a wrong grade for certain mark ranges. AI fixed this by arranging the conditions in a logically descending order (A → B → C), ensuring accurate evaluation. Correct conditional structure is essential for producing correct program decisions.