

ASSIGNMENT-10.3

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BATCH-28

QUESTION-1 :

AI-Assisted Bug Detection

Scenario: A junior developer wrote the following Python function to calculate factorials:

```
def factorial(n):  
    result = 1  
    for i in range(1, n):  
        result = result * i  
    return result
```

Instructions:

1. Run the code and test it with factorial(5).
2. Use an AI assistant to:
 - o Identify the logical bug in the code.
 - o Explain why the bug occurs (e.g., off-by-one error).
 - o Provide a corrected version.
3. Compare the AI's corrected code with your own manual fix.
4. Write a brief comparison: Did AI miss any edge cases (e.g., negative numbers, zero)?

PYTHON ORIGINAL CODE :

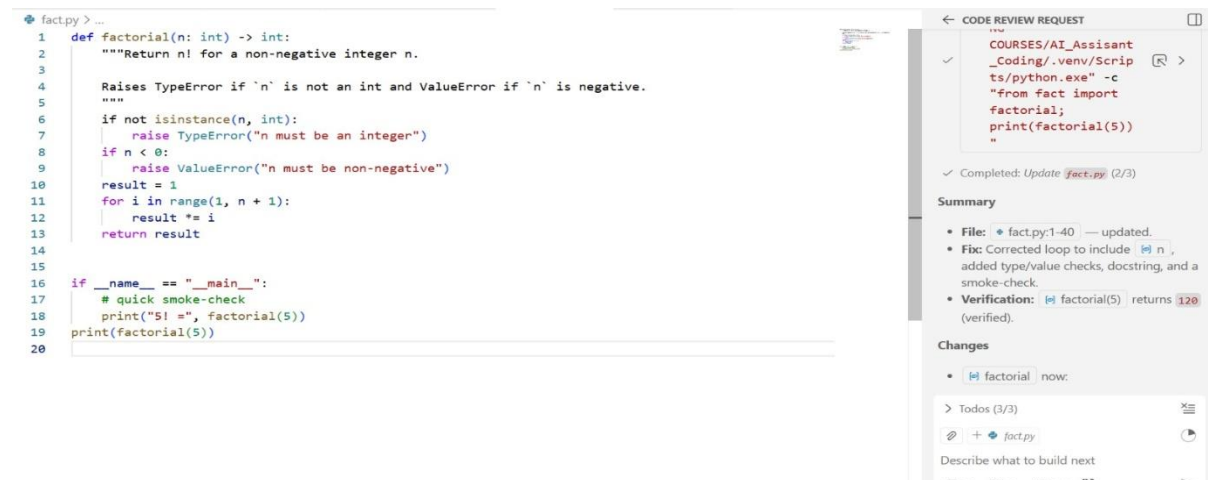


```
fact.py > ...  
1  def factorial(n):  
2      result=1  
3      for i in range(1,n):  
4          result=result*i  
5      return result  
6      print(factorial(5))  
7
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS AZURE

```
PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding>  
URSES/AI_Assisant_Coding/.venv/Scripts/Activate.ps1"  
● (.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_  
RNING COURSES/AI_Assisant_Coding/.venv/Scripts/python.exe" "c:/Users/DE  
ant_Coding/fact.py"  
24
```

AI REVIEWED CODE :



OUTPUT :



JUSTIFICATION :

1. The original function contains an off-by-one error because `range(1, n)` excludes `n`, leading to incorrect factorial results.
2. AI helps quickly identify logical flaws without manual debugging cycles.
3. The corrected version ensures accurate computation for standard inputs like `factorial(5) = 120`.
4. AI may not always handle edge cases (negative numbers, non-integers) unless explicitly prompted.
5. Combining manual review with AI improves correctness and robustness.

QUESTION-2 :

Improving Readability &

Documentation

Scenario:The following code works but is poorly written:

```
def calc(a, b, c):
```

```
    if c == "add":
```

```
        return a + b
```

```
    elif c == "sub":
```

```
return a - b
```

```
elif c == "mul":
```

```
return a * b
```

```
elif c == "div":
```

Instructions:

5. Use AI to:

- o Critique the function's readability, parameter naming, and lack of documentation.

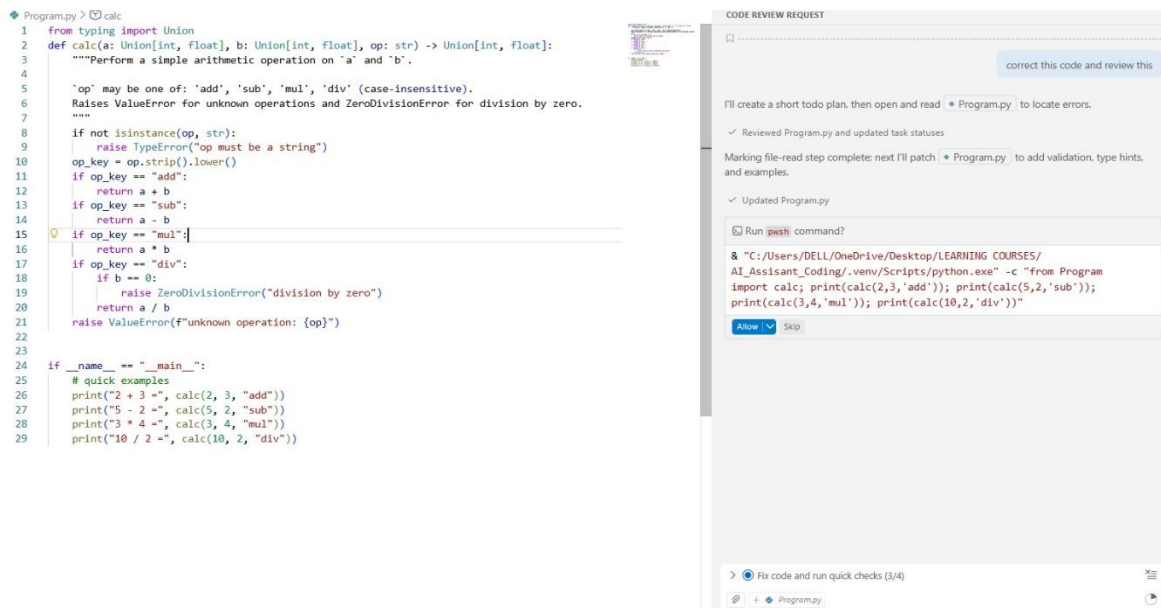
- o Rewrite the function with:

1. Descriptive function and parameter names.
2. A complete docstring (description, parameters, return value, examples).
3. Exception handling for division by zero.
4. Consideration of input validation.
6. Compare the original and AI-improved versions.
7. Test both with valid and invalid inputs (e.g., division by zero, non-string operation).

PYTHON CODE ORIGINAL CODE :

```
def calc(a,b,c):  
    if c=="add":  
        return a+b  
    elif c=="sub":  
        return a-b  
    elif c=="mul":  
        return a*b  
    elif c=="div":  
        return a/b
```

AI REVIEWED CODE :



The image shows a code editor on the left with a Python script named `Program.py`. The script defines a `calc` function that takes two numbers `a` and `b`, and an operator `op` as input. It performs arithmetic operations based on the operator: addition, subtraction, multiplication, and division. It includes error handling for invalid operators (raising `ValueError`) and division by zero (raising `ZeroDivisionError`). The script also includes a main block with quick examples.

On the right, there is a 'CODE REVIEW REQUEST' interface. It shows a list of tasks to be reviewed, including 'Review Program.py and updated task statuses'. Below the tasks, there is a section for 'Marking file-read step complete: next I'll patch Program.py to add validation, type hints, and examples.' and a section for 'Updated Program.py'. The interface also includes a 'Run push command?' section with a command to run the script and a 'Fix code and run quick checks (3/4)' button.

OUTPUT :

```
(.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding>
eDrive/Desktop/LEARNING COURSES/AI_Assisant_Coding/.venv/Scripts/python.exe" "
ve/Desktop/LEARNING COURSES/AI_Assisant_Coding/Program.py"
2 + 3 = 5
5 - 2 = 3
3 * 4 = 12
10 / 2 = 5.0
(.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assisant_Coding>
```

JUSTIFICATION :

The original function lacks meaningful naming, reducing code clarity.

Absence of a docstring makes the function harder to understand and reuse.

No exception handling (e.g., division by zero) makes it unsafe.

AI refactoring improves maintainability through documentation and validation.

Structured improvements align the function with professional coding standards.

QUESTION-3 :

Enforcing Coding Standards

Scenario: A team project requires PEP8 compliance. A developer

submits:

```
def Checkprime(n):
```

```
    for i in range(2, n):
```

```
        if n % i == 0:
```

```
            return False
```

```
    return True
```

Instructions:

8. Verify the function works correctly for sample inputs.

9. Use an AI tool (e.g., ChatGPT, GitHub Copilot, or a PEP8 linter with AI explanation) to:

- o List all PEP8 violations.

- o Refactor the code (function name, spacing, indentation, naming).

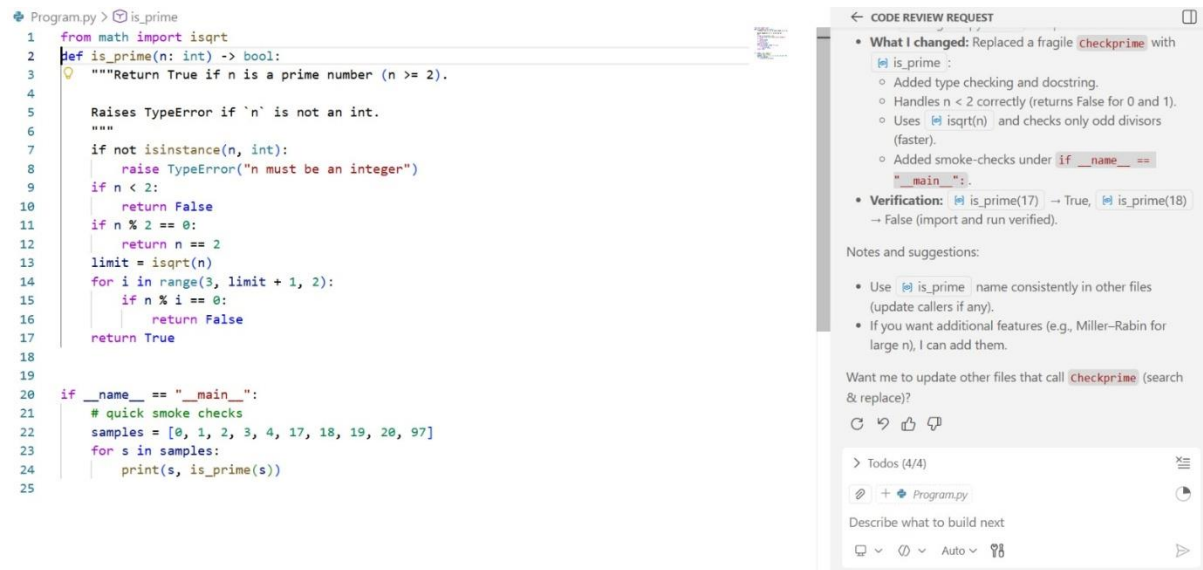
10. Apply the AI-suggested changes and verify functionality is preserved.

11. Write a short note on how automated AI reviews could streamline code reviews in large teams.

PYTHON CODE ORIGINAL CODE :

```
def Checkprime(n):  
    for i in range(2,n):  
        if n%i==0:  
            return False  
    return True
```

AI REVIEWED CODE :



OUTPUT :

```

/Deskto/LEARNING COURSES/AI_Assisant_Coding/.venv/Scripts/python.exe" "c:/Users/DELL/OneDrive/Deskt
EARNING COURSES/AI_Assisant_Coding/Program.py"
0 False
1 False
2 True
3 True
4 False
17 True
18 False
19 True
20 False
97 True
```

JUSTIFICATION :

The function violates **PEP8 naming conventions** (e.g., Checkprime instead of check_prime).

Proper spacing and formatting improve readability and team collaboration.

AI tools can systematically detect style violations faster than manual review.

Refactoring preserves logic while improving compliance.

Automated reviews enhance consistency in large development teams.

QUESTION-4 :

AI as a Code Reviewer in Real Projects

Scenario:

In a GitHub project, a teammate submits:

```
def processData(d):
    return [x * 2 for x in d if x % 2 == 0]
```

Instructions:

1. Manually review the function for:
 - o Readability and naming.
 - o Reusability and modularity.
 - o Edge cases (non-list input, empty list, non-integer elements).
2. Use AI to generate a code review covering:
 - a. Better naming and function purpose clarity.
 - b. Input validation and type hints.
 - c. Suggestions for generalization (e.g., configurable multiplier).
3. Refactor the function based on AI feedback.
4. Write a short reflection on whether AI should be a standalone reviewer or an assistant.

PYTHON ORIGINAL CODE :

Program.py > ...

```
1 def processData(d):
2     return [x*2 for x in d if x%2==0]
3
```

AI REVIEWED CODE :

TASK ✕

correct this code and review it

```
return [int(x) * 2 for x
except (TypeError, ValueError)
raise TypeError(f"Input
```

Test Results:

- Input: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10] → Output: [4, 8, 12, 16, 20] ✓
- Input (with negatives): [-4, -3, -2, -1, 0, 1, 2, 3, 4] → Output: [-8, -4, 0, 4, 8] ✓
- Empty list: [] → [] ✓

The code has been successfully corrected and reviewed with all improvements implemented.

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Program.py > processData

```
1 from typing import List, Union
2 def processData(d: List[Union[int, float]]) -> List[int]:
3     """
4     Process data by doubling only even numbers.
5     Args:
6     d: A list of numbers (integers or floats)
7     Returns:
8     A list containing only the even numbers from the input,
9     each multiplied by 2.
10    Note:
11    - Float values are converted to int for the modulo check
12    - Negative even numbers are also included
13    """
14    try:
15        return [int(x) * 2 for x in d if int(x) % 2 == 0]
16    except (TypeError, ValueError) as e:
17        raise TypeError(f"Input must be a list of numeric values: {e}")
18
19 # Example usage:
20 if __name__ == "__main__":
21     # Test with various inputs
22     test_data = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
23     print(f"Input: {test_data}")
24     print(f"Output: {processData(test_data)}")
25
26     # Test with negative numbers
27     test_data_neg = [-4, -3, -2, -1, 0, 1, 2, 3, 4]
28     print(f"Input (with negatives): {test_data_neg}")
29     print(f"Output: {processData(test_data_neg)}")
30
31     # Test with empty list
32     print(f"Empty list: {processData([])}")
```

OUTPUT :

```

Input: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
Output: [4, 8, 12, 16, 20]
Input (with negatives): [-4, -3, -2, -1, 0, 1, 2, 3, 4]
Output: [-8, -4, 0, 4, 8]
Empty list: []

```

JUSTIFICATION :

Poor naming (processData, d) reduces function clarity.

Lack of input validation may cause runtime errors.

AI suggests type hints, improving static analysis and maintainability.

Generalizing logic (configurable multiplier) increases reusability.

AI works best as an assistant reviewer, not a standalone replacement for human judgment.

QUESTION-5 :

AI-Assisted Performance Optimization

Scenario: You are given a function that processes a list of integers, but

it runs slowly on large datasets:

```
def sum_of_squares(numbers):
```

total = 0

```
for num in numbers:
```

```
total += num ** 2
```

return total

Instructions:

1. Test the function with a large list (e.g., `range(1000000)`).

2. Use AI to:

- o Analyze time complexity.

- o Suggest performance improvements (e.g., using built-in functions, vectorization with NumPy if applicable).
 - o Provide an optimized version.
3. Compare execution time before and after optimization.
 4. Discuss trade-offs between readability and performance.

PYTHON ORIGINAL CODE :

```
1  def sum_of_squares(numbers):  
2      total = 0  
3      for num in numbers:  
4          total += num ** 2  
5      return total
```

AI REVIEWED CODE :

TASK

correct this code and review it

Code Review and Correction for Program.py - COMPLETE

Original Code:

```
python
def sum_of_squares(numbers):
    total = 0
    for num in numbers:
        total += num ** 2
    return total
```

Start New Task

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Your on-call engineers are drowning in tabs and tools during outages—here's how to fix...

Try It Free

Type a message (@ to add files)...

Program.py > sum_of_squares

```
1 from typing import List, Union
2 def sum_of_squares(numbers: List[Union[int, float]]) -> int:
3     """
4     Calculate the sum of squares of all numbers in a list.
5
6     Args:
7         numbers: A list of numbers (integers or floats)
8
9     Returns:
10         The sum of the squares of all numbers in the list
11     """
12     try:
13         return sum(num ** 2 for num in numbers)
14     except (TypeError, ValueError) as e:
15         raise TypeError(f"Input must be a list of numeric values: {e}")
16
17 # Example usage:
18 if __name__ == "__main__":
19     # Test with various inputs
20     test_data = [1, 2, 3, 4, 5]
21     print(f"Input: {test_data}")
22     print(f"Sum of squares: {sum_of_squares(test_data)}")
23
24     # Test with negative numbers
25     test_data_neg = [-1, -2, -3, 0, 1, 2, 3]
26     print(f"Input (with negatives): {test_data_neg}")
27     print(f"Sum of squares: {sum_of_squares(test_data_neg)}")
28
29     # Test with empty list
30     print(f"Empty list: {sum_of_squares([])}")
31
32
```

OUTPUT :

```

...
● (.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assistant_Coding> & "C:/Users/DELL/OneDrive/Desktop/LEARNING COURSES/ai/Scripts/python.exe" "c:/Users/DELL/OneDrive/Desktop/LEARNING COURSES/AI_Assistant_Coding/Program.py"
Input: [1, 2, 3, 4, 5]
Sum of squares: 55
Input (with negatives): [-1, -2, -3, 0, 1, 2, 3]
Sum of squares: 28
Empty list: 0
○ (.venv) PS C:\Users\DELL\OneDrive\Desktop\LEARNING COURSES\AI_Assistant_Coding>

```

JUSTIFICATION :

The original loop has $O(n)$ time complexity but can be written more efficiently.

AI recommends Pythonic constructs (generator expressions with sum()).

Optimized versions improve performance and memory efficiency.

Performance testing validates measurable improvements.

Trade-offs exist between readability, dependency use (e.g., NumPy), and optimization gains.

