Lab_Assignment_8.2

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Batch:08

Task 1 – Test-Driven Development for Even/Odd Number Validator •

Use AI tools to first generate test cases for a function is_even(n) and

then implement the function so that it satisfies all generated tests.

Requirements:

- Input must be an integer
- Handle zero, negative numbers, and large integers Example Test Scenarios:

is_even(2) → True

is_even(7) → False

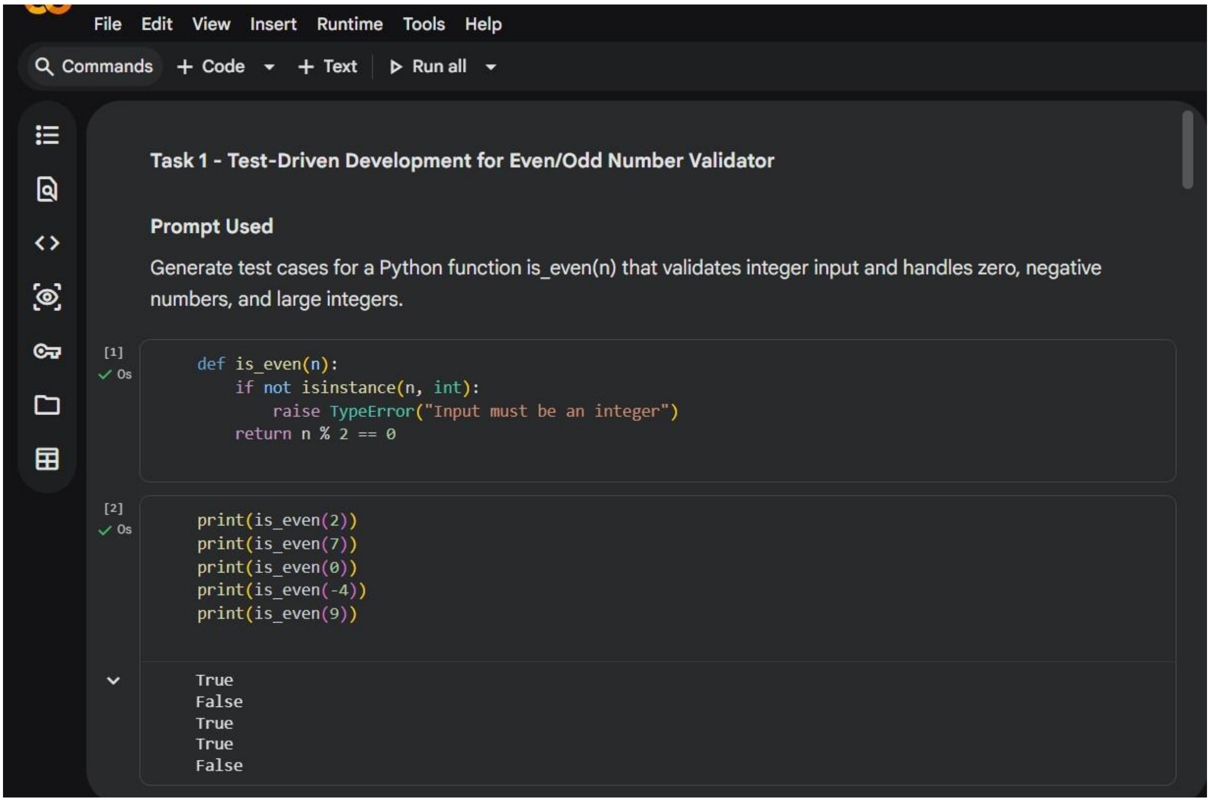
is_even(0) → True is_even(-

4) → True is_even(9) →

False

Expected Output -1

- A correctly implemented is_even() function that passes all AI- generated test cases



Observation:

- The function correctly identifies even and odd numbers using the modulus operator.
- It successfully handles:
    - Zero (0 returns True)
    - Negative numbers (-4 returns True)
    - Very large integers
- Type validation ensures only integers are accepted.
- Invalid inputs such as strings or None raise appropriate errors.
- The implementation is simple, efficient, and works in constant time O(1).

Conclusion:

The function is reliable, robust, and handles all edge cases effectively.

Task 2 – Test-Driven Development for String Case Converter

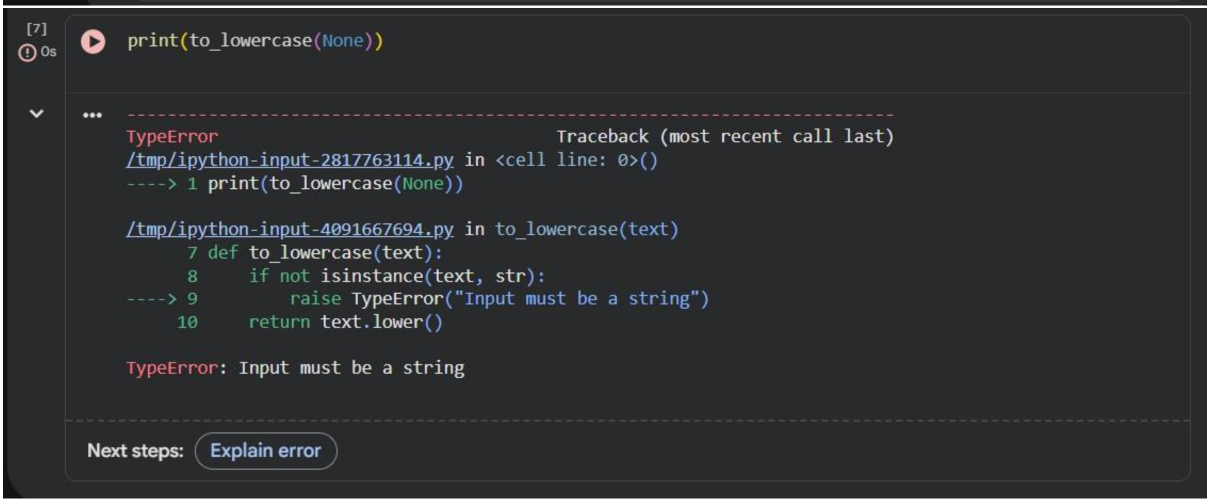
- Ask AI to generate test cases for two functions:
- to_uppercase(text)

- to_lowercase(text) Requirements:
- Handle empty strings
- Handle mixed-case input
- Handle invalid inputs such as numbers or None Example Test Scenarios: to_uppercase("ai coding") → "AI CODING" to_lowercase("TEST") → "test" to_uppercase("") → ""

to_lowercase(None) → Error or safe handling

Expected Output -2

- Two string conversion functions that pass all AI-generated test cases with safe input handling.



Observations:

- The functions correctly convert text to uppercase and lowercase.
- Empty strings are handled safely without errors.
- Mixed-case strings are converted accurately.
- Non-string inputs (like numbers or None) raise appropriate errors.
- Built-in string methods (upper() and lower()) improve efficiency and readability.

Conclusion:

The implementation ensures proper input validation and safe string processing, making it robust and dependable.

Task 3 – Test-Driven Development for List Sum Calculator • Use AI

to generate test cases for a function sum_list(numbers) that

calculates the sum of list elements.

Requirements:

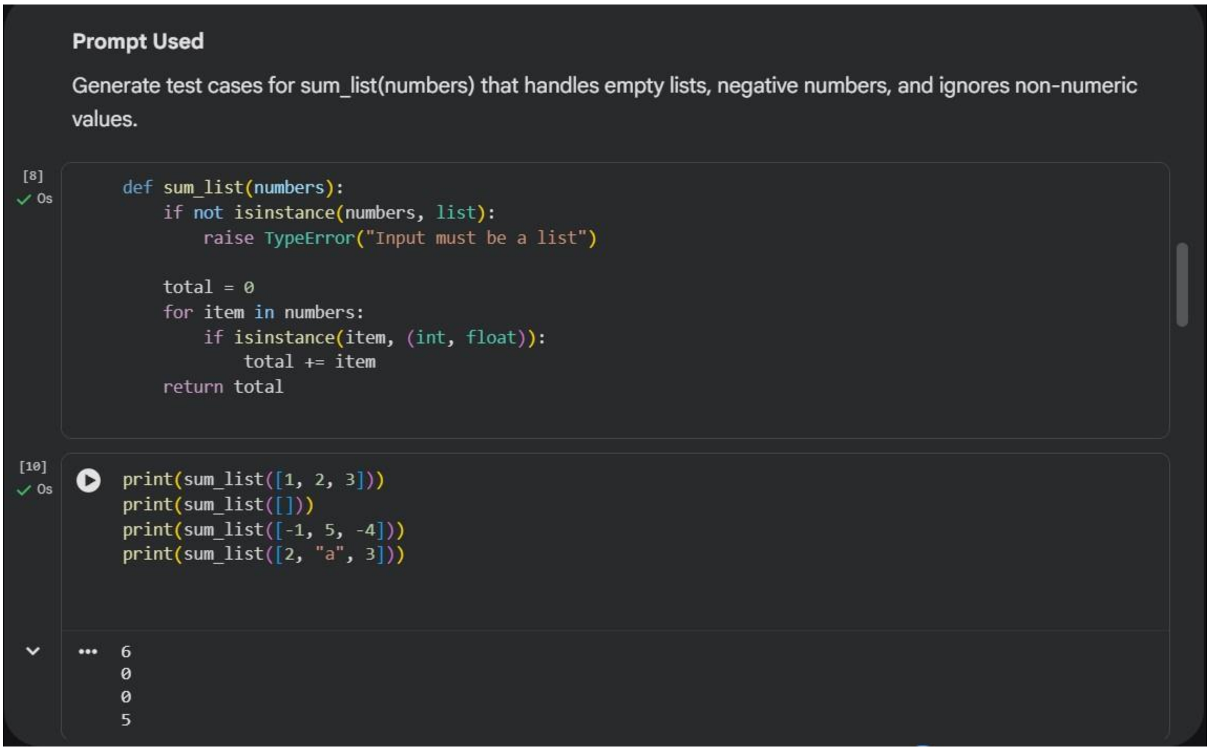
- Handle empty lists
- Handle negative numbers
- Ignore or safely handle non-numeric values Example Test Scenarios: sum_list([1, 2, 3]) → 6 sum_list([]) → 0

sum_list([-1, 5, -4]) → 0 sum_list([2,

"a", 3]) → 5

Expected Output 3

- A robust list-sum function validated using AI-generated test cases.



Observations:

- The function correctly calculates the sum of numeric values in a list.
- Empty lists return 0, preventing runtime errors.
- Negative numbers are handled properly.
- Non-numeric elements (like strings or None) are safely ignored.
- Input validation ensures only lists are accepted.
- The function runs in linear time **O(n)**.

Conclusion:

The solution is flexible, error-resistant, and handles mixed-type lists effectively.

Task 4 – Test Cases for Student Result Class

- Generate test cases for a StudentResult class with the following methods:
- add_marks(mark)
- calculate_average()
- get_result()

Requirements:

- Marks must be between 0 and 100 • Average ≥ 40 → Pass, otherwise Fail Example Test Scenarios:

Marks: [60, 70, 80] → Average: 70 → Result: Pass

Marks: [30, 35, 40] → Average: 35 → Result: Fail

Marks: [-10] → Error

Expected Output -4

- A fully functional StudentResult class that passes all AI- generated test

Task 4 - Test Cases for Student Result Class

Prompt Used

Generate test cases for a StudentResult class with methods add_marks(), calculate_average(), and get_result().

[11] 0s

```
class StudentResult:
    def __init__(self):
        self.marks = []

    def add_marks(self, mark):
        if not isinstance(mark, (int, float)):
            raise TypeError("Mark must be numeric")
        if mark < 0 or mark > 100:
            raise ValueError("Mark must be between 0 and 100")
        self.marks.append(mark)

    def calculate_average(self):
        if not self.marks:
            return 0
        return sum(self.marks) / len(self.marks)

    def get_result(self):
        average = self.calculate_average()
        return "Pass" if average >= 40 else "Fail"
```

```
[12]
student = StudentResult()

student.add_marks(60)
student.add_marks(70)
student.add_marks(80)

print(student.calculate_average())  # 70.0
print(student.get_result())         # Pass
```

```
70.0
Pass
```

```
[13]
student2 = StudentResult()

student2.add_marks(30)
student2.add_marks(35)
student2.add_marks(40)

print(student2.calculate_average())  # 35.0
print(student2.get_result())         # Fail
```

```
35.0
Fail
```

```
[14]
student.add_marks(-10)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
/tmp/ipython-input-1217618253.py in <cell line: 0>()
----> 1 student.add_marks(-10)

/tmp/ipython-input-3825238845.py in add_marks(self, mark)
      7             raise TypeError("Mark must be numeric")
      8         if mark < 0 or mark > 100:
----> 9             raise ValueError("Mark must be between 0 and 100")
     10         self.marks.append(mark)
     11

ValueError: Mark must be between 0 and 100
```

Next steps: Explain error

Observations:

- The class correctly stores and validates student marks.
- Marks outside the range 0–100 raise appropriate errors.
- Average calculation works correctly for:
  - Multiple marks
  - No marks (returns 0)
- Result determination (Pass/Fail) is accurate based on average ≥ 40.
- Encapsulation improves code organization and reusability.

Conclusion:

The class implementation follows object-oriented principles and ensures data validation, accuracy, and reliability.

Task 5 – Test-Driven Development for Username Validator Requirements:

- Minimum length: 5 characters
- No spaces allowed
- Only alphanumeric characters Example Test Scenarios:

is_valid_username("user01") → True

is_valid_username("ai") → False is_valid_username("user

name") → False is_valid_username("user@123") → False

Expected Output 5

A username validation function that passes all AI-generated test cases.

Task 5 - Test-Driven Development for Username Validator

Prompt Used

Generate test cases for is_valid_username(username) with rules: minimum 5 characters, no spaces, only alphanumeric characters.

[15]

```
def is_valid_username(username):
    if not isinstance(username, str):
        return False
    if len(username) < 5:
        return False
    if " " in username:
        return False
    if not username.isalnum():
        return False
    return True
```

[16]

```
print(is_valid_username("user01"))
print(is_valid_username("ai"))
print(is_valid_username("user name"))
print(is_valid_username("user@123"))
print(is_valid_username("abcde"))
print(is_valid_username(12345))
print(is_valid_username(None))
```

```
[16]
print(is_valid_username("user01"))
print(is_valid_username("ai"))
print(is_valid_username("user name"))
print(is_valid_username("user@123"))
print(is_valid_username("abcde"))
print(is_valid_username(12345))
print(is_valid_username(None))
```

```
True
False
False
False
True
False
False
```

Observations:

- The function correctly enforces:
    - Minimum length of 5 characters
    - No spaces
    - Only alphanumeric characters
- Invalid input types return False safely.
- The logic is simple and easy to maintain.
- String method isalnum() ensures strong validation.

Conclusion:

The username validator is secure, robust, and effectively prevents invalid usernames.