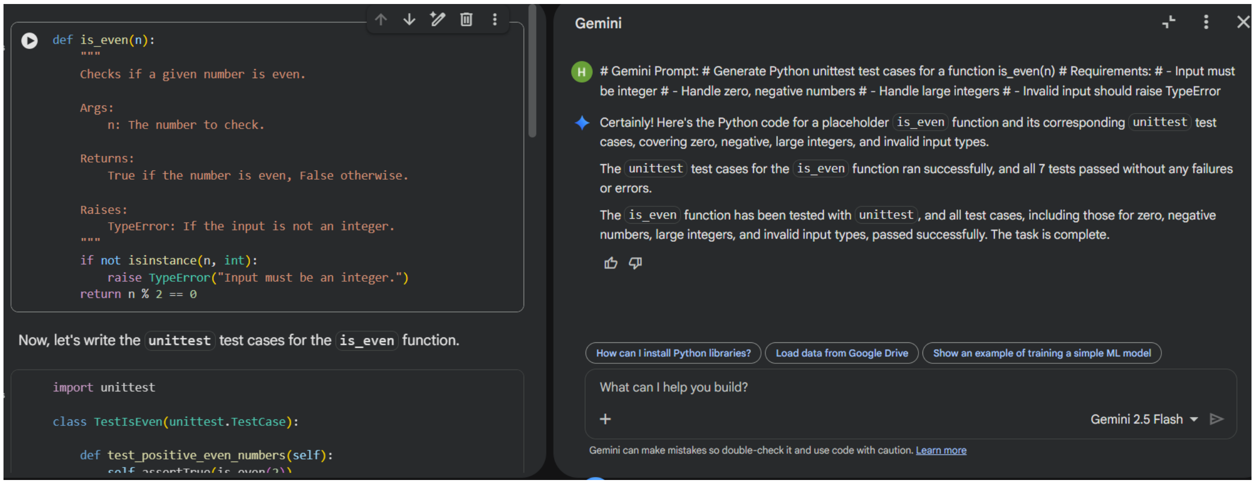
ASSIGNMENT – 8.2

Thumma Hasini | 2303A52076 | Batch – 37

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.

Prompt: Generate Python unittest test cases for a function is_even(n) with integer validation, zero, negative, large integers, and invalid input handling.



```
def is_even(n):
    """
    Checks if a given number is even.

    Args:
        n: The number to check.

    Returns:
        True if the number is even, False otherwise.

    Raises:
        TypeError: If the input is not an integer.
    """
    if not isinstance(n, int):
        raise TypeError("Input must be an integer.")
    return n % 2 == 0
```

Now, let's write the `unittest` test cases for the `is_even` function.

```
import unittest

class TestIsEven(unittest.TestCase):

    def test_positive_even_numbers(self):
        self.assertTrue(is_even(2))
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a function is_even(n) # Requirements: # - Input must be integer # - Handle zero, negative numbers # - Handle large integers # - Invalid input should raise TypeError

Certainly! Here's the Python code for a placeholder `is_even` function and its corresponding `unittest` test cases, covering zero, negative, large integers, and invalid input types.

The `unittest` test cases for the `is_even` function ran successfully, and all 7 tests passed without any failures or errors.

The `is_even` function has been tested with `unittest`, and all test cases, including those for zero, negative numbers, large integers, and invalid input types, passed successfully. The task is complete.

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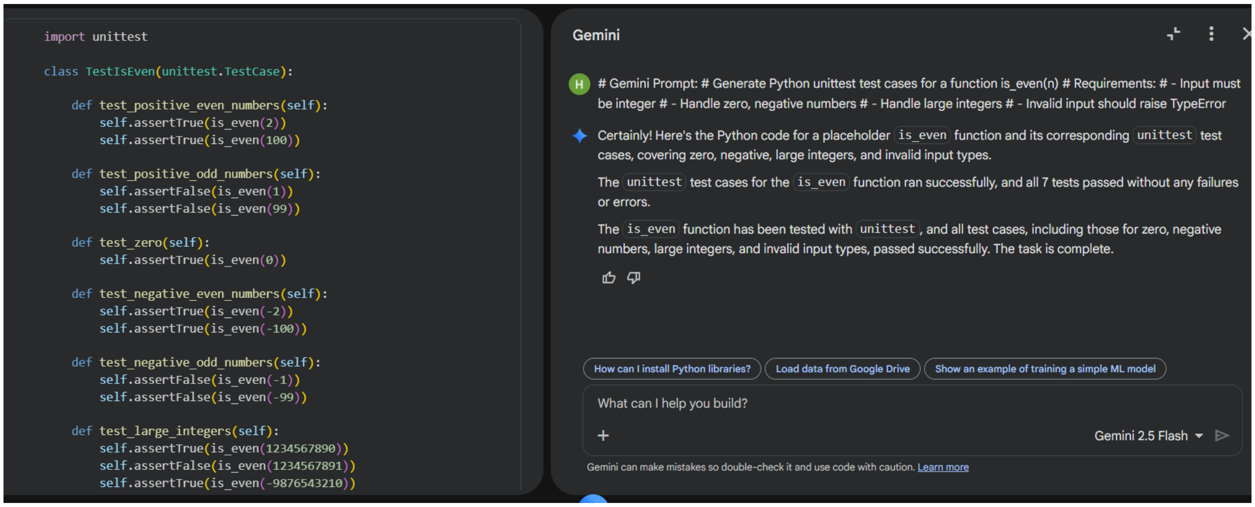

```
import unittest

class TestIsEven(unittest.TestCase):

    def test_positive_even_numbers(self):
        self.assertTrue(is_even(2))
        self.assertTrue(is_even(100))

    def test_positive_odd_numbers(self):
        self.assertFalse(is_even(1))
        self.assertFalse(is_even(99))

    def test_zero(self):
        self.assertTrue(is_even(0))

    def test_negative_even_numbers(self):
        self.assertTrue(is_even(-2))
        self.assertTrue(is_even(-100))

    def test_negative_odd_numbers(self):
        self.assertFalse(is_even(-1))
        self.assertFalse(is_even(-99))

    def test_large_integers(self):
        self.assertTrue(is_even(1234567890))
        self.assertFalse(is_even(1234567891))
        self.assertTrue(is_even(-9876543210))
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a function is_even(n) # Requirements: # - Input must be integer # - Handle zero, negative numbers # - Handle large integers # - Invalid input should raise TypeError

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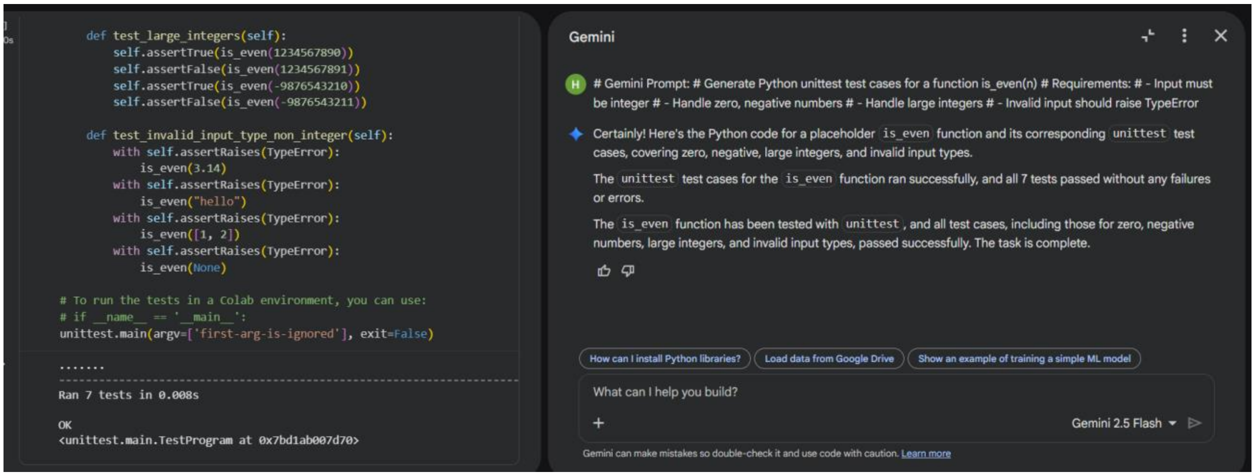

```
    def test_large_integers(self):
        self.assertTrue(is_even(1234567890))
        self.assertFalse(is_even(1234567891))
        self.assertTrue(is_even(-9876543210))
        self.assertFalse(is_even(-9876543211))

    def test_invalid_input_type_non_integer(self):
        with self.assertRaises(TypeError):
            is_even(3.14)
        with self.assertRaises(TypeError):
            is_even("hello")
        with self.assertRaises(TypeError):
            is_even([1, 2])
        with self.assertRaises(TypeError):
            is_even(None)

# To run the tests in a Colab environment, you can use:
# if __name__ == '__main__':
unittest.main(argv=['first-arg-is-ignored'], exit=False)
```

```
.......
----------------------------------------------------------------------
Ran 7 tests in 0.008s

OK
<unittest.main.TestProgram at 0x7bd1ab007d70>
```

Gemini Prompt: # Generate Python unittest test cases for a function is_even(n) # Requirements: # - Input must be integer # - Handle zero, negative numbers # - Handle large integers # - Invalid input should raise TypeError

Certainly! Here's the Python code for a placeholder `is_even` function and its corresponding `unittest` test cases, covering zero, negative, large integers, and invalid input types.

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The `is_even` function has been tested with `unittest`, and all test cases, including those for zero, negative numbers, large integers, and invalid input types, passed successfully. The task is complete.

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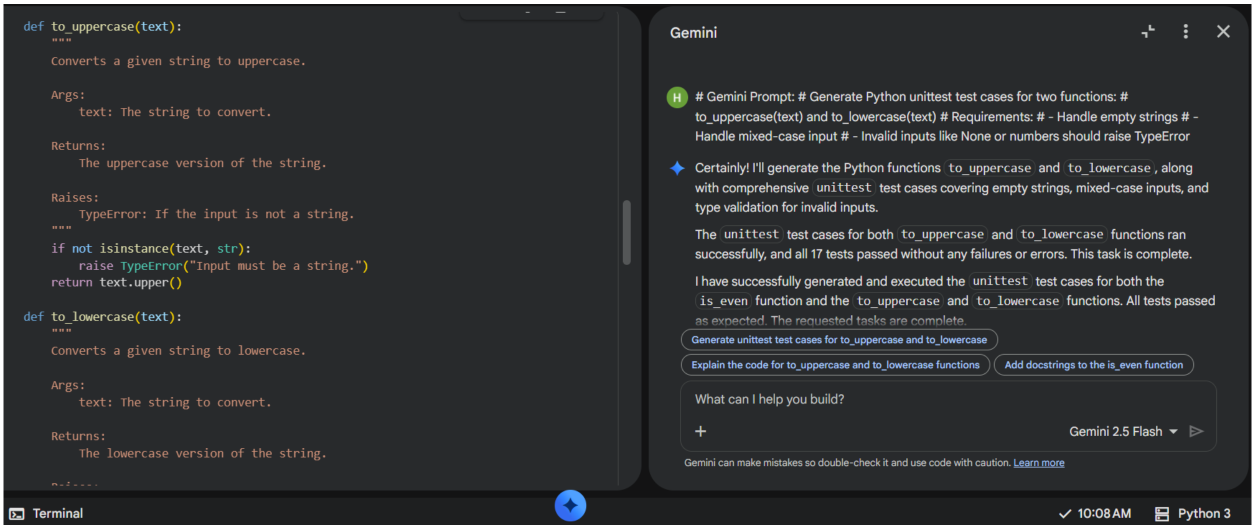
Explanation: In this task, test cases were generated using Gemini following the Test-Driven Development approach. The is_even() function was implemented to satisfy all test conditions, including handling negative numbers, zero, large integers, and raising errors for invalid inputs.

Task 2 – Test-Driven Development for String Case Converter

Ask AI to generate test cases for two functions:

- to_uppercase(text)
- to_lowercase(text)

Prompt: Generate unittest test cases for to_uppercase(text) and to_lowercase(text) functions with empty string, mixed-case, and invalid input handling.



```
def to_uppercase(text):
    """
    Converts a given string to uppercase.

    Args:
        text: The string to convert.

    Returns:
        The uppercase version of the string.

    Raises:
        TypeError: If the input is not a string.
    """
    if not isinstance(text, str):
        raise TypeError("Input must be a string.")
    return text.upper()

def to_lowercase(text):
    """
    Converts a given string to lowercase.

    Args:
        text: The string to convert.

    Returns:
        The lowercase version of the string.
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for two functions: # to_uppercase(text) and to_lowercase(text) # Requirements: # - Handle empty strings # - Handle mixed-case input # - Invalid inputs like None or numbers should raise TypeError

Certainly! I'll generate the Python functions `to_uppercase` and `to_lowercase`, along with comprehensive `unittest` test cases covering empty strings, mixed-case inputs, and type validation for invalid inputs.

The `unittest` test cases for both `to_uppercase` and `to_lowercase` functions ran successfully, and all 17 tests passed without any failures or errors. This task is complete.

I have successfully generated and executed the `unittest` test cases for both the `is_even` function and the `to_uppercase` and `to_lowercase` functions. All tests passed as expected. The requested tasks are complete.

Generate unittest test cases for to_uppercase and to_lowercase
Explain the code for to_uppercase and to_lowercase functions
Add docstrings to the is_even function
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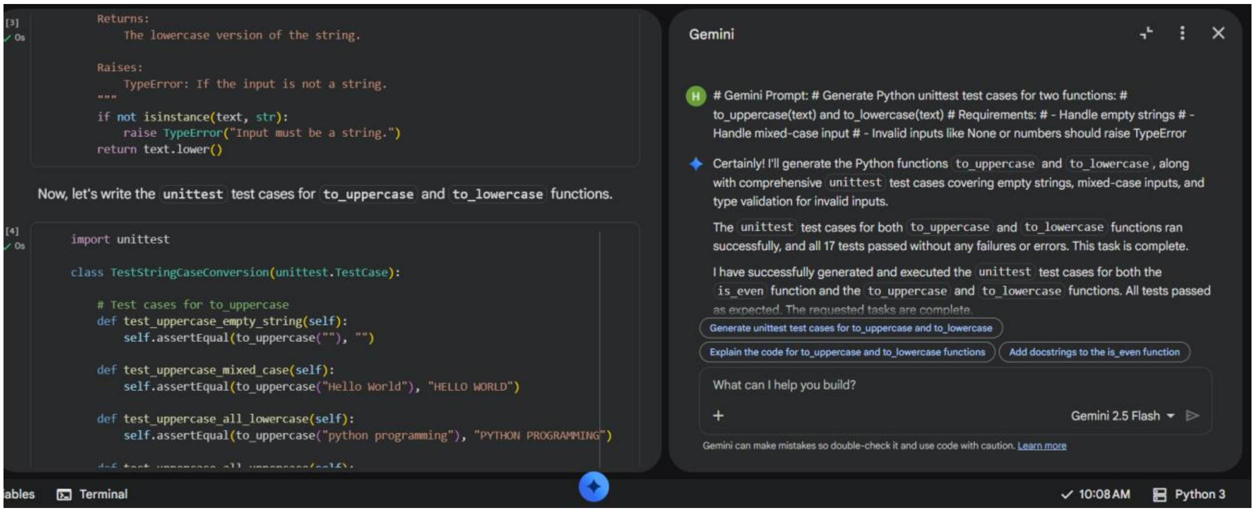

```
[3]
        Returns:
            The lowercase version of the string.

        Raises:
            TypeError: If the input is not a string.
        """
        if not isinstance(text, str):
            raise TypeError("Input must be a string.")
        return text.lower()
```

Now, let's write the `unittest` test cases for `to_uppercase` and `to_lowercase` functions.

```
[4]
import unittest

class TestStringCaseConversion(unittest.TestCase):

    # Test cases for to_uppercase
    def test_uppercase_empty_string(self):
        self.assertEqual(to_uppercase(""), "")

    def test_uppercase_mixed_case(self):
        self.assertEqual(to_uppercase("Hello World"), "HELLO WORLD")

    def test_uppercase_all_lowercase(self):
        self.assertEqual(to_uppercase("python programming"), "PYTHON PROGRAMMING")
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for two functions: # to_uppercase(text) and to_lowercase(text) # Requirements: # - Handle empty strings # - Handle mixed-case input # - Invalid inputs like None or numbers should raise TypeError

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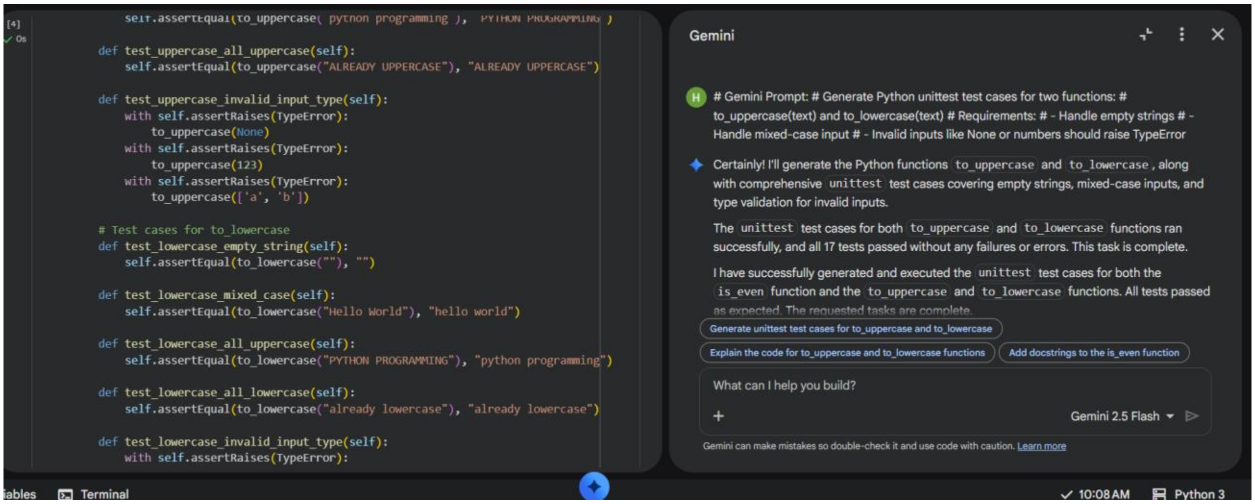

```
[4]
        self.assertEqual(to_uppercase("python programming"), "PYTHON PROGRAMMING")

    def test_uppercase_all_uppercase(self):
        self.assertEqual(to_uppercase("ALREADY UPPERCASE"), "ALREADY UPPERCASE")

    def test_uppercase_invalid_input_type(self):
        with self.assertRaises(TypeError):
            to_uppercase(None)
        with self.assertRaises(TypeError):
            to_uppercase(123)
        with self.assertRaises(TypeError):
            to_uppercase(['a', 'b'])

    # Test cases for to_lowercase
    def test_lowercase_empty_string(self):
        self.assertEqual(to_lowercase(""), "")

    def test_lowercase_mixed_case(self):
        self.assertEqual(to_lowercase("Hello World"), "hello world")

    def test_lowercase_all_uppercase(self):
        self.assertEqual(to_lowercase("PYTHON PROGRAMMING"), "python programming")

    def test_lowercase_all_lowercase(self):
        self.assertEqual(to_lowercase("already lowercase"), "already lowercase")

    def test_lowercase_invalid_input_type(self):
        with self.assertRaises(TypeError):
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for two functions: # to_uppercase(text) and to_lowercase(text) # Requirements: # - Handle empty strings # - Handle mixed-case input # - Invalid inputs like None or numbers should raise TypeError

Certainly! I'll generate the Python functions `to_uppercase` and `to_lowercase`, along with comprehensive `unittest` test cases covering empty strings, mixed-case inputs, and type validation for invalid inputs.

The `unittest` test cases for both `to_uppercase` and `to_lowercase` functions ran successfully, and all 17 tests passed without any failures or errors. This task is complete.

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Generate unittest test cases for to_uppercase and to_lowercase
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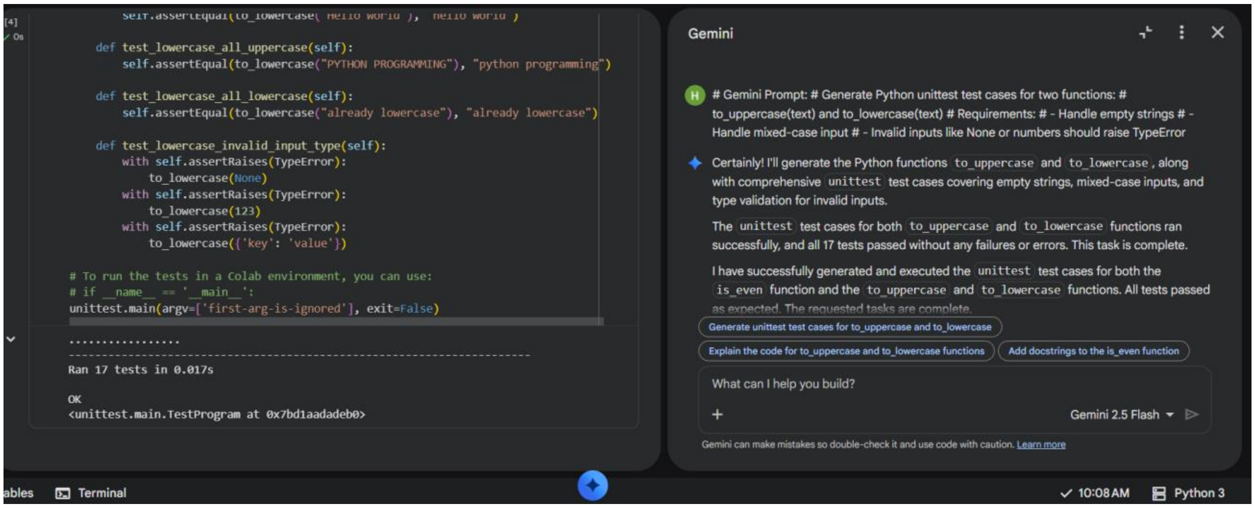
[4]
0s
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```
        self.assertEqual(to_lowercase("Hello World"), "hello world")

    def test_lowercase_all_uppercase(self):
        self.assertEqual(to_lowercase("PYTHON PROGRAMMING"), "python programming")

    def test_lowercase_all_lowercase(self):
        self.assertEqual(to_lowercase("already lowercase"), "already lowercase")

    def test_lowercase_invalid_input_type(self):
        with self.assertRaises(TypeError):
            to_lowercase(None)
        with self.assertRaises(TypeError):
            to_lowercase(123)
        with self.assertRaises(TypeError):
            to_lowercase({'key': 'value'})

# To run the tests in a Colab environment, you can use:
# if __name__ == '__main__':
unittest.main(argv=['first-arg-is-ignored'], exit=False)
```

```
.................
----------------------------------------------------------------------
Ran 17 tests in 0.017s

OK
<unittest.main.TestProgram at 0x7bd1aadadeb0>
```

Gemini Prompt: # Generate Python unittest test cases for two functions: # to_uppercase(text) and to_lowercase(text) # Requirements: # - Handle empty strings # - Handle mixed-case input # - Invalid inputs like None or numbers should raise TypeError

Certainly! I'll generate the Python functions `to_uppercase` and `to_lowercase`, along with comprehensive `unittest` test cases covering empty strings, mixed-case inputs, and type validation for invalid inputs.

The `unittest` test cases for both `to_uppercase` and `to_lowercase` functions ran successfully, and all 17 tests passed without any failures or errors. This task is complete.

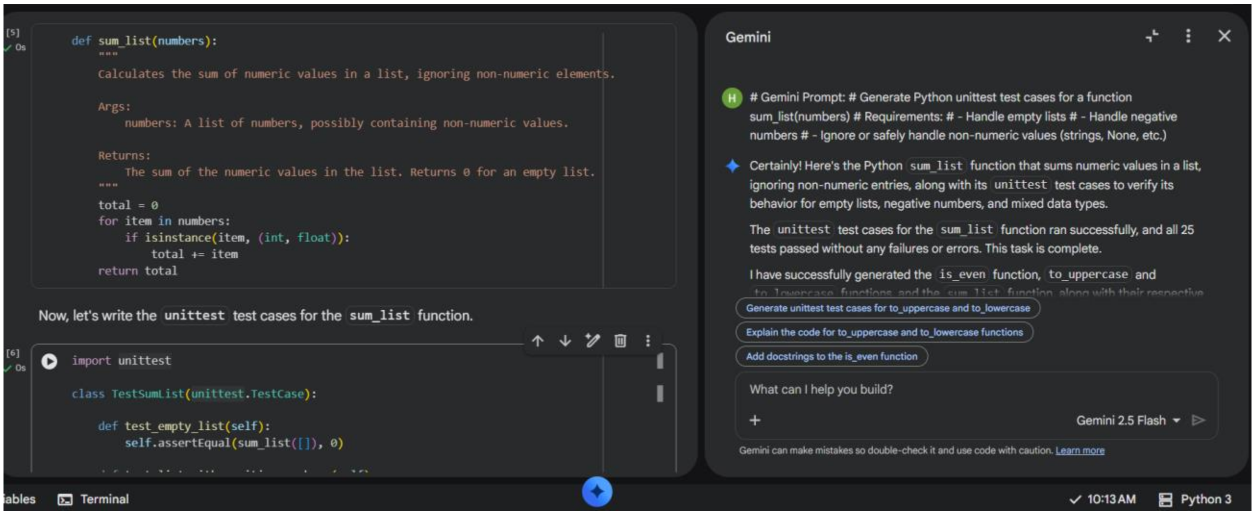
I have successfully generated and executed the `unittest` test cases for both the `is_even` function and the `to_uppercase` and `to_lowercase` functions. All tests passed as expected. The requested tasks are complete.

Explanation: Using Gemini, test cases were generated before implementation following the Test-Driven Development approach. The functions were implemented to correctly convert string cases and safely handle invalid inputs by raising Type Error.

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.

Prompt: Generate unittest test cases for a function sum_list(numbers) that handles empty lists, negative numbers, and ignores non-numeric values.


[5]
0s
[6]
0s
ables
Terminal
Gemini
Generate unittest test cases for to_uppercase and to_lowercase
Explain the code for to_uppercase and to_lowercase functions
Add docstrings to the is_even function
What can I help you build?
+
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10:13 AM
Python 3

```
def sum_list(numbers):
    """
    Calculates the sum of numeric values in a list, ignoring non-numeric elements.

    Args:
        numbers: A list of numbers, possibly containing non-numeric values.

    Returns:
        The sum of the numeric values in the list. Returns 0 for an empty list.
    """
    total = 0
    for item in numbers:
        if isinstance(item, (int, float)):
            total += item
    return total
```

Now, let's write the `unittest` test cases for the `sum_list` function.

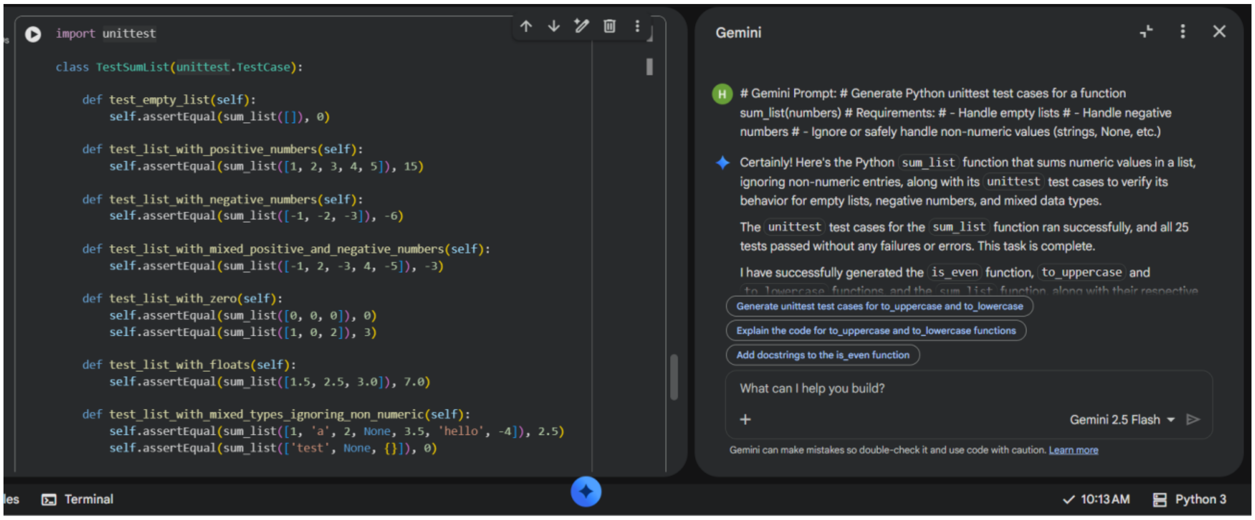
```
import unittest

class TestSumList(unittest.TestCase):

    def test_empty_list(self):
        self.assertEqual(sum_list([]), 0)
```

Gemini Prompt: # Generate Python unittest test cases for a function sum_list(numbers) # Requirements: # - Handle empty lists # - Handle negative numbers # - Ignore or safely handle non-numeric values (strings, None, etc.)

Certainly! Here's the Python `sum_list` function that sums numeric values in a list, ignoring non-numeric entries, along with its `unittest` test cases to verify its behavior for empty lists, negative numbers, and mixed data types.

The `unittest` test cases for the `sum_list` function ran successfully, and all 25 tests passed without any failures or errors. This task is complete.

I have successfully generated the `is_even` function, `to_uppercase` and `to_lowercase` functions and the `sum_list` function along with their respective



```python
import unittest

class TestSumList(unittest.TestCase):

    def test_empty_list(self):
        self.assertEqual(sum_list([]), 0)

    def test_list_with_positive_numbers(self):
        self.assertEqual(sum_list([1, 2, 3, 4, 5]), 15)

    def test_list_with_negative_numbers(self):
        self.assertEqual(sum_list([-1, -2, -3]), -6)

    def test_list_with_mixed_positive_and_negative_numbers(self):
        self.assertEqual(sum_list([-1, 2, -3, 4, -5]), -3)

    def test_list_with_zero(self):
        self.assertEqual(sum_list([0, 0, 0]), 0)
        self.assertEqual(sum_list([1, 0, 2]), 3)

    def test_list_with_floats(self):
        self.assertEqual(sum_list([1.5, 2.5, 3.0]), 7.0)

    def test_list_with_mixed_types_ignoring_non_numeric(self):
        self.assertEqual(sum_list([1, 'a', 2, None, 3.5, 'hello', -4]), 2.5)
        self.assertEqual(sum_list(['test', None, {}]), 0)
```

Gemini Prompt: # Generate Python unittest test cases for a function sum_list(numbers) # Requirements: # - Handle empty lists # - Handle negative numbers # - Ignore or safely handle non-numeric values (strings, None, etc.)

Certainly! Here's the Python `sum_list` function that sums numeric values in a list, ignoring non-numeric entries, along with its `unittest` test cases to verify its behavior for empty lists, negative numbers, and mixed data types.

The `unittest` test cases for the `sum_list` function ran successfully, and all 25 tests passed without any failures or errors. This task is complete.

I have successfully generated the `is_even` function, `to_uppercase` and `to_lowercase` functions, and the `sum_list` function, along with their respective

Generate unittest test cases for to_uppercase and to_lowercase
Explain the code for to_uppercase and to_lowercase functions
Add docstrings to the is_even function
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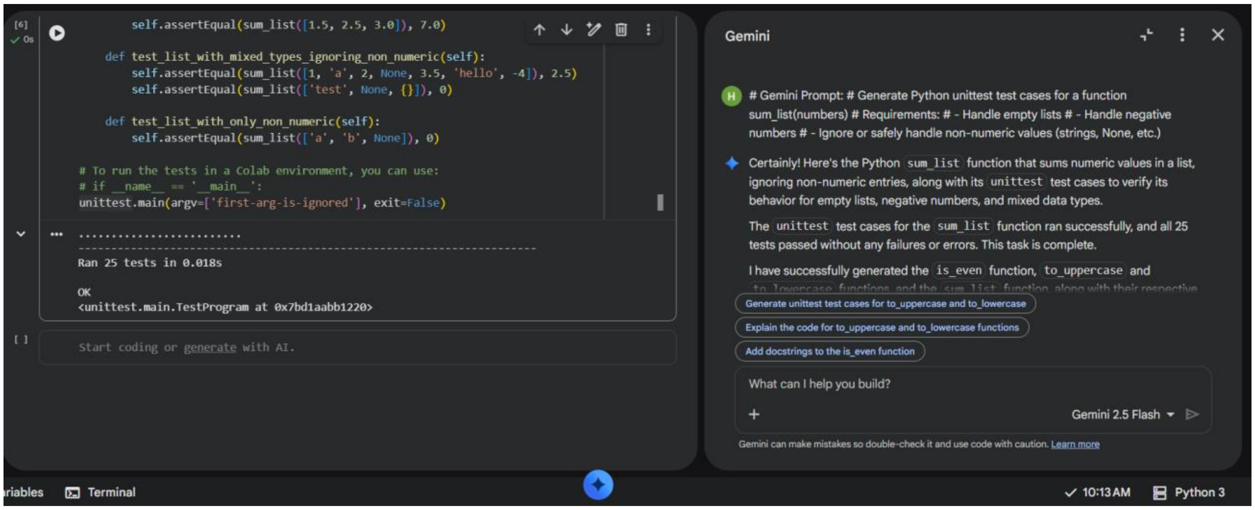

```python
        self.assertEqual(sum_list([1.5, 2.5, 3.0]), 7.0)

    def test_list_with_mixed_types_ignoring_non_numeric(self):
        self.assertEqual(sum_list([1, 'a', 2, None, 3.5, 'hello', -4]), 2.5)
        self.assertEqual(sum_list(['test', None, {}]), 0)

    def test_list_with_only_non_numeric(self):
        self.assertEqual(sum_list(['a', 'b', None]), 0)

# To run the tests in a Colab environment, you can use:
# if __name__ == '__main__':
unittest.main(argv=['first-arg-is-ignored'], exit=False)
```

```
.........................
----------------------------------------------------------------------
Ran 25 tests in 0.018s

OK
<unittest.main.TestProgram at 0x7bd1aabb1220>
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a function sum_list(numbers) # Requirements: # - Handle empty lists # - Handle negative numbers # - Ignore or safely handle non-numeric values (strings, None, etc.)

Certainly! Here's the Python `sum_list` function that sums numeric values in a list, ignoring non-numeric entries, along with its `unittest` test cases to verify its behavior for empty lists, negative numbers, and mixed data types.

The `unittest` test cases for the `sum_list` function ran successfully, and all 25 tests passed without any failures or errors. This task is complete.

I have successfully generated the `is_even` function, `to_uppercase` and `to_lowercase` functions, and the `sum_list` function, along with their respective

Generate unittest test cases for to_uppercase and to_lowercase
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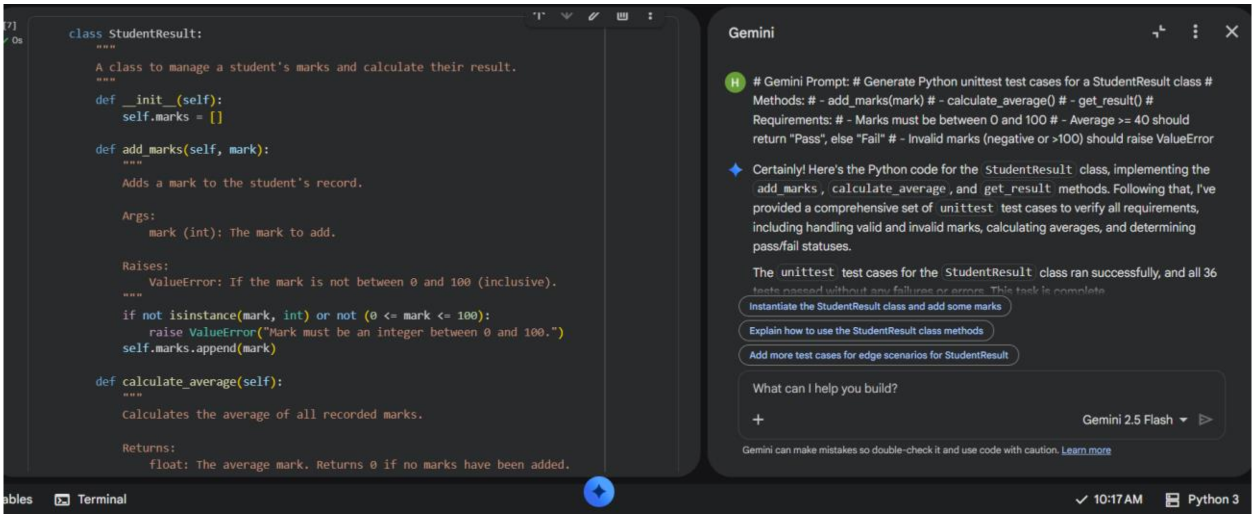
Explanation: In this task, Gemini was used to generate test cases following the Test-Driven Development approach. The sum_list() function was implemented to correctly compute the sum of numeric values while safely ignoring non-numeric elements and handling empty lists.

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()

Prompt: Generate unittest test cases for a Student Result class with mark validation, average calculation, and pass/fail decision.



```
class StudentResult:
    """
    A class to manage a student's marks and calculate their result.
    """
    def __init__(self):
        self.marks = []

    def add_marks(self, mark):
        """
        Adds a mark to the student's record.

        Args:
            mark (int): The mark to add.

        Raises:
            ValueError: If the mark is not between 0 and 100 (inclusive).
        """
        if not isinstance(mark, int) or not (0 <= mark <= 100):
            raise ValueError("Mark must be an integer between 0 and 100.")
        self.marks.append(mark)

    def calculate_average(self):
        """
        Calculates the average of all recorded marks.

        Returns:
            float: The average mark. Returns 0 if no marks have been added.
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a StudentResult class # Methods: # - add_marks(mark) # - calculate_average() # - get_result() # Requirements: # - Marks must be between 0 and 100 # - Average >= 40 should return "Pass", else "Fail" # - Invalid marks (negative or >100) should raise ValueError

Certainly! Here's the Python code for the `StudentResult` class, implementing the `add_marks`, `calculate_average`, and `get_result` methods. Following that, I've provided a comprehensive set of `unittest` test cases to verify all requirements, including handling valid and invalid marks, calculating averages, and determining pass/fail statuses.

The `unittest` test cases for the `StudentResult` class ran successfully, and all 36 tests passed without any failures or errors. This task is complete

[7]
0s
Instantiate the StudentResult class and add some marks
Explain how to use the StudentResult class methods
Add more test cases for edge scenarios for StudentResult
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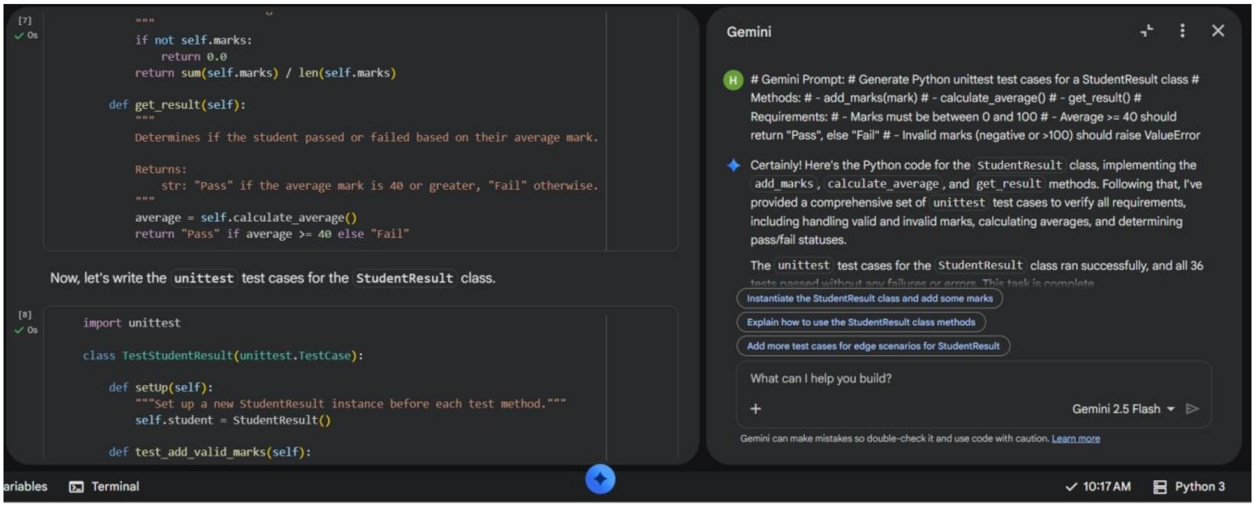

```
        """
        if not self.marks:
            return 0.0
        return sum(self.marks) / len(self.marks)

    def get_result(self):
        """
        Determines if the student passed or failed based on their average mark.

        Returns:
            str: "Pass" if the average mark is 40 or greater, "Fail" otherwise.
        """
        average = self.calculate_average()
        return "Pass" if average >= 40 else "Fail"
```

Now, let's write the `unittest` test cases for the `StudentResult` class.

```
import unittest

class TestStudentResult(unittest.TestCase):

    def setUp(self):
        """Set up a new StudentResult instance before each test method."""
        self.student = StudentResult()

    def test_add_valid_marks(self):
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a StudentResult class # Methods: # - add_marks(mark) # - calculate_average() # - get_result() # Requirements: # - Marks must be between 0 and 100 # - Average >= 40 should return "Pass", else "Fail" # - Invalid marks (negative or >100) should raise ValueError

Certainly! Here's the Python code for the `StudentResult` class, implementing the `add_marks`, `calculate_average`, and `get_result` methods. Following that, I've provided a comprehensive set of `unittest` test cases to verify all requirements, including handling valid and invalid marks, calculating averages, and determining pass/fail statuses.

The `unittest` test cases for the `StudentResult` class ran successfully, and all 36 tests passed without any failures or errors. This task is complete

[7]
0s
[8]
0s
Instantiate the StudentResult class and add some marks
Explain how to use the StudentResult class methods
Add more test cases for edge scenarios for StudentResult
What can I help you build?
Gemini 2.5 Flash
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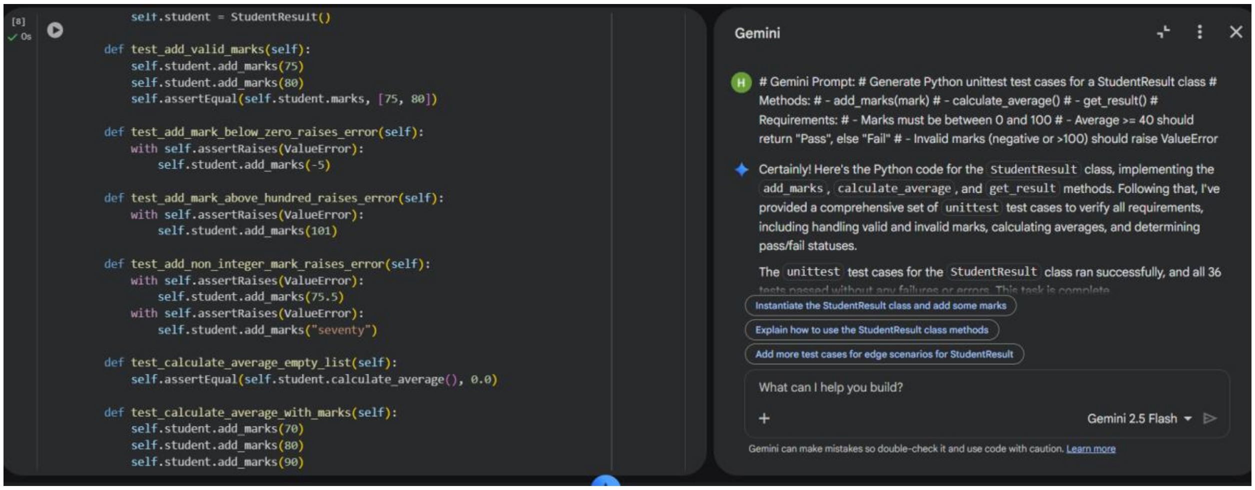
ariables
Terminal
10:17 AM
Python 3



```
        self.student = StudentResult()

    def test_add_valid_marks(self):
        self.student.add_marks(75)
        self.student.add_marks(80)
        self.assertEqual(self.student.marks, [75, 80])

    def test_add_mark_below_zero_raises_error(self):
        with self.assertRaises(ValueError):
            self.student.add_marks(-5)

    def test_add_mark_above_hundred_raises_error(self):
        with self.assertRaises(ValueError):
            self.student.add_marks(101)

    def test_add_non_integer_mark_raises_error(self):
        with self.assertRaises(ValueError):
            self.student.add_marks(75.5)
        with self.assertRaises(ValueError):
            self.student.add_marks("seventy")

    def test_calculate_average_empty_list(self):
        self.assertEqual(self.student.calculate_average(), 0.0)

    def test_calculate_average_with_marks(self):
        self.student.add_marks(70)
        self.student.add_marks(80)
        self.student.add_marks(90)
```

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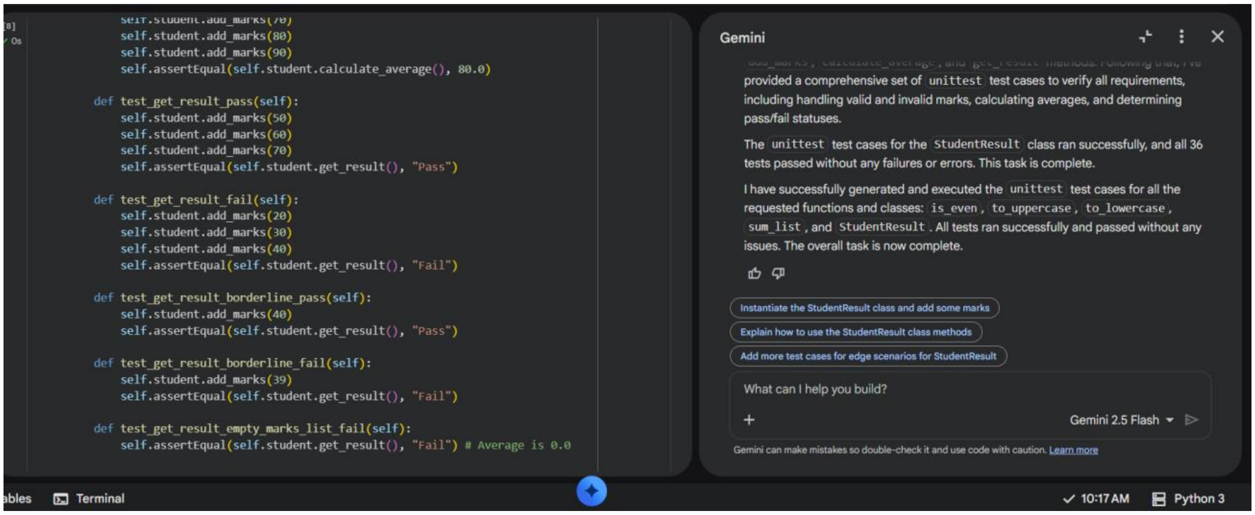

```
        self.student.add_marks(70)
        self.student.add_marks(80)
        self.student.add_marks(90)
        self.assertEqual(self.student.calculate_average(), 80.0)

    def test_get_result_pass(self):
        self.student.add_marks(50)
        self.student.add_marks(60)
        self.student.add_marks(70)
        self.assertEqual(self.student.get_result(), "Pass")

    def test_get_result_fail(self):
        self.student.add_marks(20)
        self.student.add_marks(30)
        self.student.add_marks(40)
        self.assertEqual(self.student.get_result(), "Fail")

    def test_get_result_borderline_pass(self):
        self.student.add_marks(40)
        self.assertEqual(self.student.get_result(), "Pass")

    def test_get_result_borderline_fail(self):
        self.student.add_marks(39)
        self.assertEqual(self.student.get_result(), "Fail")

    def test_get_result_empty_marks_list_fail(self):
        self.assertEqual(self.student.get_result(), "Fail") # Average is 0.0
```

provided a comprehensive set of `unittest` test cases to verify all requirements, including handling valid and invalid marks, calculating averages, and determining pass/fail statuses.

The `unittest` test cases for the `StudentResult` class ran successfully, and all 36 tests passed without any failures or errors. This task is complete.

I have successfully generated and executed the `unittest` test cases for all the requested functions and classes: `is_even`, `to_uppercase`, `to_lowercase`, `sum_list`, and `StudentResult`. All tests ran successfully and passed without any issues. The overall task is now complete.

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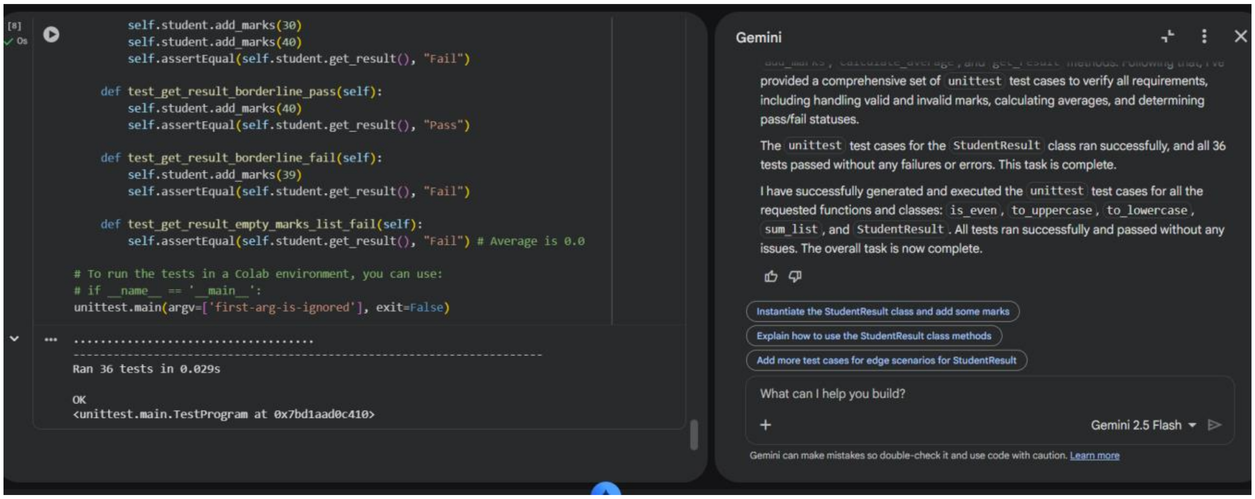

```
        self.student.add_marks(30)
        self.student.add_marks(40)
        self.assertEqual(self.student.get_result(), "Fail")

    def test_get_result_borderline_pass(self):
        self.student.add_marks(40)
        self.assertEqual(self.student.get_result(), "Pass")

    def test_get_result_borderline_fail(self):
        self.student.add_marks(39)
        self.assertEqual(self.student.get_result(), "Fail")

    def test_get_result_empty_marks_list_fail(self):
        self.assertEqual(self.student.get_result(), "Fail") # Average is 0.0

# To run the tests in a Colab environment, you can use:
# if __name__ == '__main__':
unittest.main(argv=['first-arg-is-ignored'], exit=False)
```

```
....................................
----------------------------------------------------------------------
Ran 36 tests in 0.029s

OK
<unittest.main.TestProgram at 0x7bd1aad0c410>
```

provided a comprehensive set of `unittest` test cases to verify all requirements, including handling valid and invalid marks, calculating averages, and determining pass/fail statuses.

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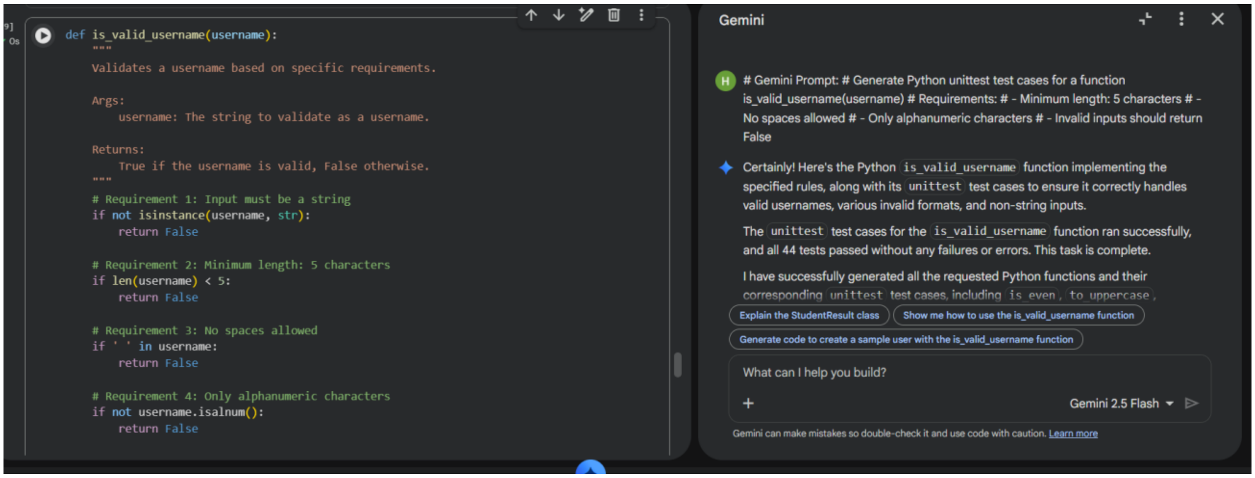
Explanation: Using Gemini, test cases were generated for the StudentResult class following Test-Driven Development. The class was implemented to validate marks, calculate average scores, and determine pass or fail status based on defined conditions.

Task 5 – Test-Driven Development for Username Validator

Requirements:

- Minimum length: 5 characters
- No spaces allowed
- Only alphanumeric characters

Prompt: Generate unittest test cases for a username validation function with length, space, and character constraints.



```python
def is_valid_username(username):
    """
    Validates a username based on specific requirements.

    Args:
        username: The string to validate as a username.

    Returns:
        True if the username is valid, False otherwise.
    """
    # Requirement 1: Input must be a string
    if not isinstance(username, str):
        return False

    # Requirement 2: Minimum length: 5 characters
    if len(username) < 5:
        return False

    # Requirement 3: No spaces allowed
    if ' ' in username:
        return False

    # Requirement 4: Only alphanumeric characters
    if not username.isalnum():
        return False
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a function is_valid_username(username) # Requirements: # - Minimum length: 5 characters # - No spaces allowed # - Only alphanumeric characters # - Invalid inputs should return False

Certainly! Here's the Python `is_valid_username` function implementing the specified rules, along with its `unittest` test cases to ensure it correctly handles valid usernames, various invalid formats, and non-string inputs.

The `unittest` test cases for the `is_valid_username` function ran successfully, and all 44 tests passed without any failures or errors. This task is complete.

I have successfully generated all the requested Python functions and their corresponding `unittest` test cases, including `is_even`, `to_uppercase`,

Explain the StudentResult class
Show me how to use the is_valid_username function
Generate code to create a sample user with the is_valid_username function
What can I help you build?
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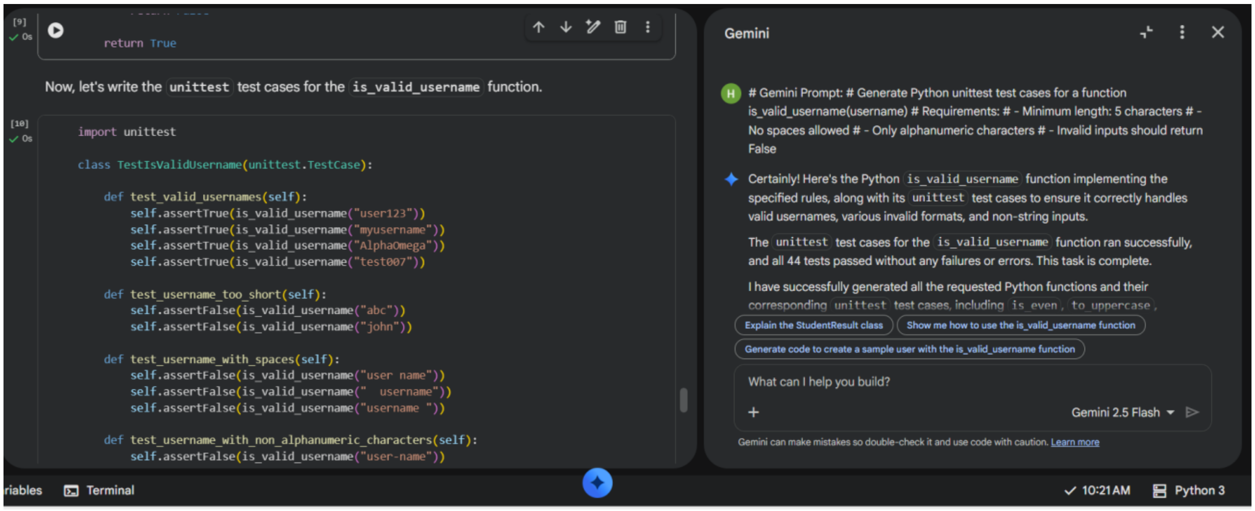

```python
        return True
```

Now, let's write the `unittest` test cases for the `is_valid_username` function.

```python
import unittest

class TestIsValidUsername(unittest.TestCase):

    def test_valid_usernames(self):
        self.assertTrue(is_valid_username("user123"))
        self.assertTrue(is_valid_username("myusername"))
        self.assertTrue(is_valid_username("AlphaOmega"))
        self.assertTrue(is_valid_username("test007"))

    def test_username_too_short(self):
        self.assertFalse(is_valid_username("abc"))
        self.assertFalse(is_valid_username("john"))

    def test_username_with_spaces(self):
        self.assertFalse(is_valid_username("user name"))
        self.assertFalse(is_valid_username("  username"))
        self.assertFalse(is_valid_username("username "))

    def test_username_with_non_alphanumeric_characters(self):
        self.assertFalse(is_valid_username("user-name"))
```

Gemini

Gemini Prompt: # Generate Python unittest test cases for a function is_valid_username(username) # Requirements: # - Minimum length: 5 characters # - No spaces allowed # - Only alphanumeric characters # - Invalid inputs should return False

Certainly! Here's the Python `is_valid_username` function implementing the specified rules, along with its `unittest` test cases to ensure it correctly handles valid usernames, various invalid formats, and non-string inputs.

The `unittest` test cases for the `is_valid_username` function ran successfully, and all 44 tests passed without any failures or errors. This task is complete.

I have successfully generated all the requested Python functions and their corresponding `unittest` test cases, including `is_even`, `to_uppercase`,

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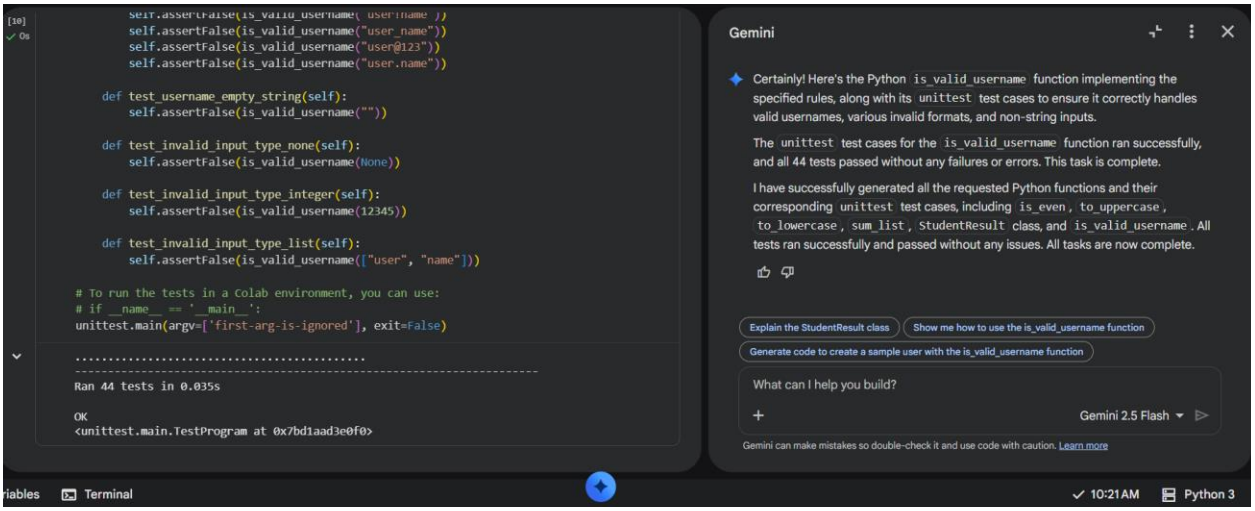

```python
        self.assertFalse(is_valid_username("user!name"))
        self.assertFalse(is_valid_username("user_name"))
        self.assertFalse(is_valid_username("user@123"))
        self.assertFalse(is_valid_username("user.name"))

    def test_username_empty_string(self):
        self.assertFalse(is_valid_username(""))

    def test_invalid_input_type_none(self):
        self.assertFalse(is_valid_username(None))

    def test_invalid_input_type_integer(self):
        self.assertFalse(is_valid_username(12345))

    def test_invalid_input_type_list(self):
        self.assertFalse(is_valid_username(["user", "name"]))

# To run the tests in a Colab environment, you can use:
# if __name__ == '__main__':
unittest.main(argv=['first-arg-is-ignored'], exit=False)
```

```
............................................
----------------------------------------------------------------------
Ran 44 tests in 0.035s

OK
<unittest.main.TestProgram at 0x7bd1aad3e0f0>
```

Gemini

Certainly! Here's the Python `is_valid_username` function implementing the specified rules, along with its `unittest` test cases to ensure it correctly handles valid usernames, various invalid formats, and non-string inputs.

The `unittest` test cases for the `is_valid_username` function ran successfully, and all 44 tests passed without any failures or errors. This task is complete.

I have successfully generated all the requested Python functions and their corresponding `unittest` test cases, including `is_even`, `to_uppercase`, `to_lowercase`, `sum_list`, `StudentResult` class, and `is_valid_username`. All tests ran successfully and passed without any issues. All tasks are now complete.

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Explanation: In this task, Gemini was used to generate test cases for validating usernames using the Test-Driven Development approach. The is_valid_username() function was implemented to enforce length, spacing, and alphanumeric constraints as per the test cases.