# LAB ASSIGNMENT 8

NAME:- CH VISHWANATH RAO

BATCH:02

HTNO: 2303A51095

Lab 8: Test-Driven Development with AI – Generating and Working with Test Cases

**Task Description #1 (Username Validator – Apply AI in Authentication Context)**

• Task: Use AI to generate at least 3 assert test cases for a function

is_valid_username(username) and then implement the function using Test-Driven Development principles.

• Requirements:

o Username length must be between 5 and 15 characters.

o Must contain only alphabets and digits.

o Must not start with a digit.

o No spaces allowed.

Example Assert Test Cases:

assert is_valid_username("User123") == True

assert is_valid_username("12User") == False

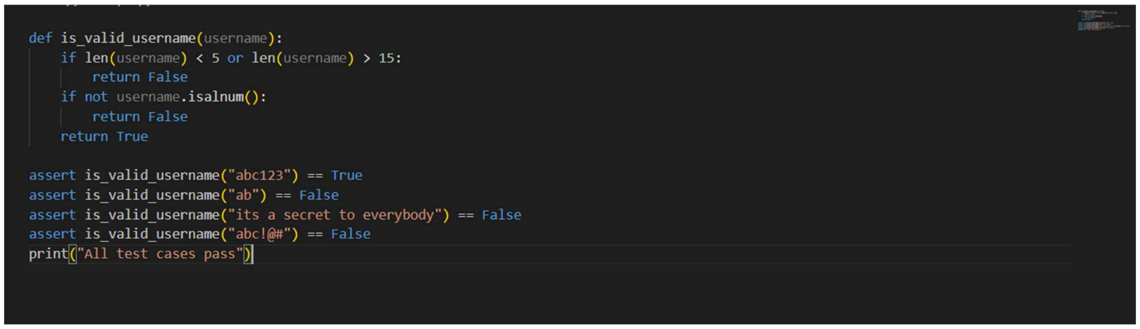
assert is_valid_username("Us er") == False

Expected Output #1:

• Username validation logic successfully passing all AI-

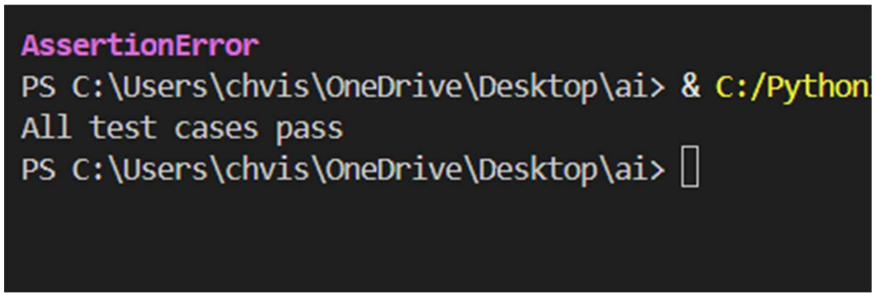
generated test cases.

CODE:



```
def is_valid_username(username):
    if len(username) < 5 or len(username) > 15:
        return False
    if not username.isalnum():
        return False
    return True

assert is_valid_username("abc123") == True
assert is_valid_username("ab") == False
assert is_valid_username("its a secret to everybody") == False
assert is_valid_username("abc!@#") == False
print("All test cases pass")
```

OUTPUT:



```
AssertionError
PS C:\Users\chvis\OneDrive\Desktop\ai> & C:/Python
All test cases pass
PS C:\Users\chvis\OneDrive\Desktop\ai> 
```

**Task Description #2 (Even–Odd & Type Classification – Apply AI for Robust Input Handling)**

• Task: Use AI to generate at least 3 assert test cases for a

function classify_value(x) and implement it using conditional

logic and loops.

• Requirements:

o If input is an integer, classify as "Even" or "Odd".

o If input is 0, return "Zero".

o If input is non-numeric, return "Invalid Input".

Example Assert Test Cases:

assert classify_value(8) == "Even"

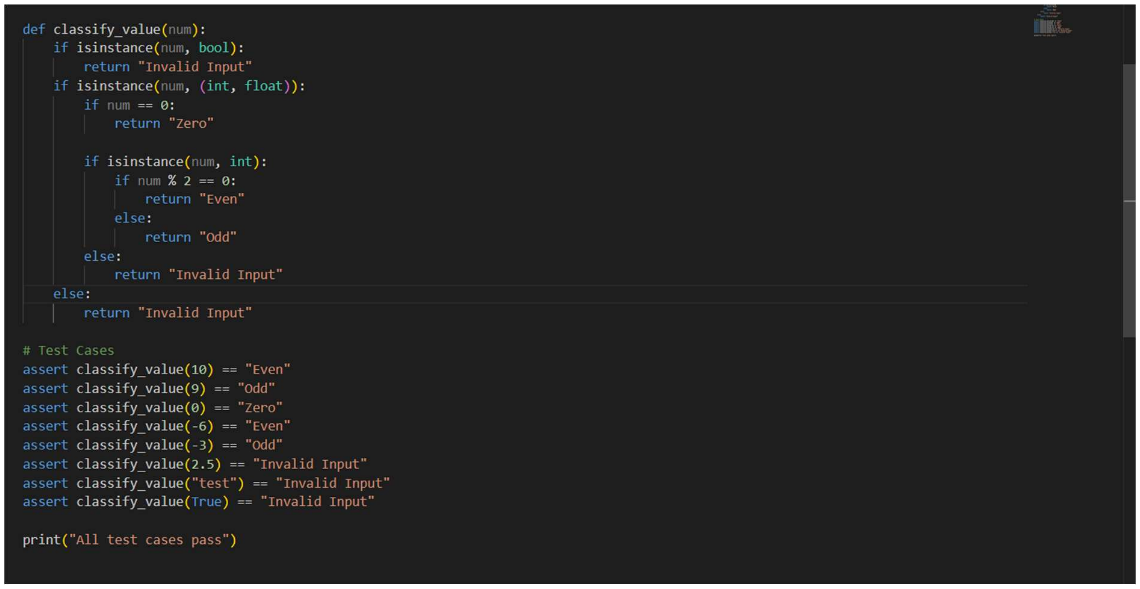
assert classify_value(7) == "Odd"

assert classify_value("abc") == "Invalid Input"

Expected Output #2:

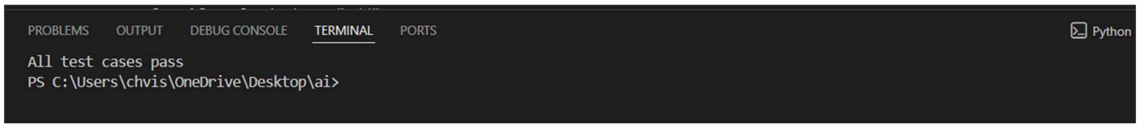
• Function correctly classifying values and passing all test cases.

CODE:



```python
def classify_value(num):
    if isinstance(num, bool):
        return "Invalid Input"
    if isinstance(num, (int, float)):
        if num == 0:
            return "Zero"

        if isinstance(num, int):
            if num % 2 == 0:
                return "Even"
            else:
                return "Odd"
        else:
            return "Invalid Input"
    else:
        return "Invalid Input"

# Test Cases
assert classify_value(10) == "Even"
assert classify_value(9) == "Odd"
assert classify_value(0) == "Zero"
assert classify_value(-6) == "Even"
assert classify_value(-3) == "Odd"
assert classify_value(2.5) == "Invalid Input"
assert classify_value("test") == "Invalid Input"
assert classify_value(True) == "Invalid Input"

print("All test cases pass")
```

OUTPUT:



```
All test cases pass
PS C:\Users\chvis\OneDrive\Desktop\ai>
```

**Task Description #3 (Palindrome Checker – Apply AI for String Normalization)**

• Task: Use AI to generate at least 3 assert test cases for a

function is_palindrome(text) and implement the function.

• Requirements:

o Ignore case, spaces, and punctuation.

o Handle edge cases such as empty strings and single

characters.

Example Assert Test Cases:

assert is_palindrome("Madam") == True

assert is_palindrome("A man a plan a canal Panama") ==

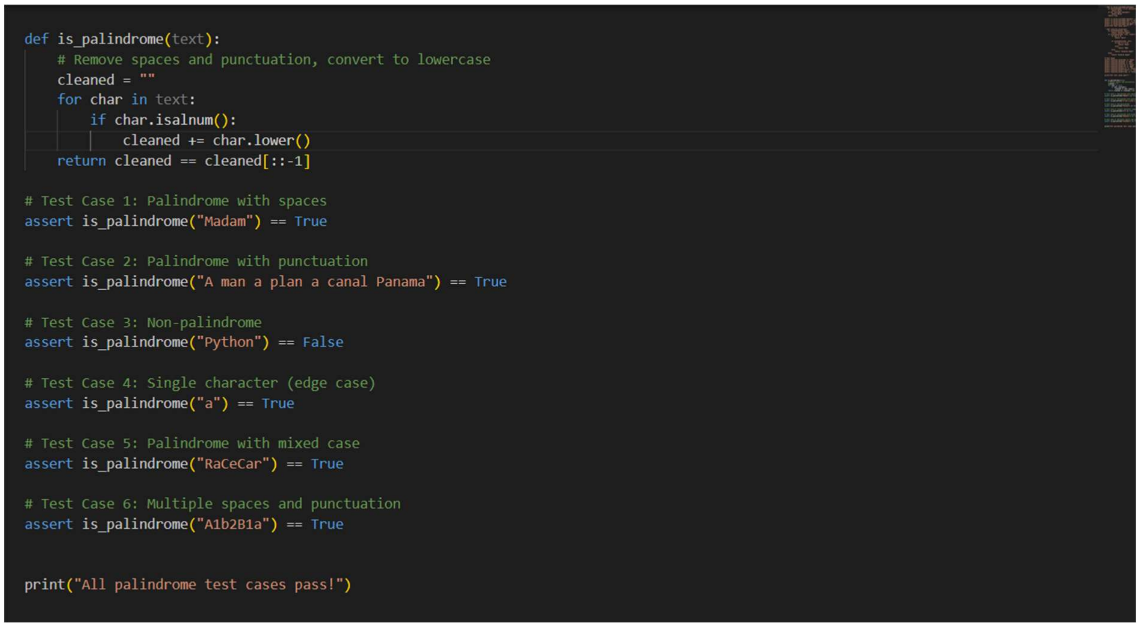
True

assert is_palindrome("Python") == False

Expected Output #3:

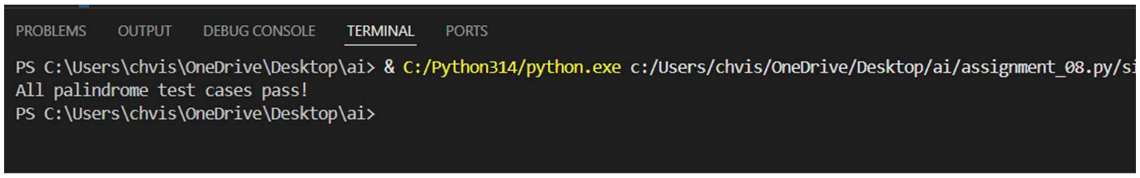
• Function correctly identifying palindromes and passing all AI-generated tests.

CODE:



```python
def is_palindrome(text):
    # Remove spaces and punctuation, convert to lowercase
    cleaned = ""
    for char in text:
        if char.isalnum():
            cleaned += char.lower()
    return cleaned == cleaned[::-1]

# Test Case 1: Palindrome with spaces
assert is_palindrome("Madam") == True

# Test Case 2: Palindrome with punctuation
assert is_palindrome("A man a plan a canal Panama") == True

# Test Case 3: Non-palindrome
assert is_palindrome("Python") == False

# Test Case 4: Single character (edge case)
assert is_palindrome("a") == True

# Test Case 5: Palindrome with mixed case
assert is_palindrome("RaCeCar") == True

# Test Case 6: Multiple spaces and punctuation
assert is_palindrome("A1b2B1a") == True


print("All palindrome test cases pass!")
```

OUTPUT:



```
PS C:\Users\chvis\OneDrive\Desktop\ai> & C:/Python314/python.exe c:/Users/chvis/OneDrive/Desktop/ai/assignment_08.py/si
All palindrome test cases pass!
PS C:\Users\chvis\OneDrive\Desktop\ai>
```

## Task Description #4 (Email ID Validation – Apply AI for DataValidation)

• Task: Use AI to generate at least 3 assert test cases for a

function validate_email(email) and implement the function.

• Requirements:

o Must contain @ and .

o Must not start or end with special characters.

o Should handle invalid formats gracefully.

Example Assert Test Cases:

assert validate_email("user@example.com") == True

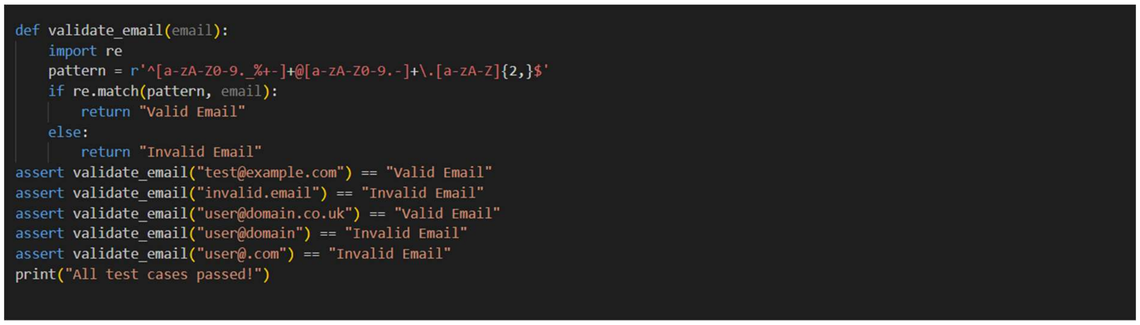
assert validate_email("userexample.com") == False

assert validate_email("@gmail.com") == False

Expected Output #5:

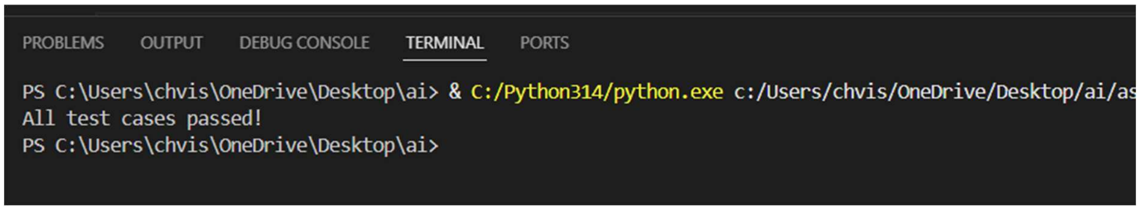
• Email validation function passing all AI-generated test case & handling edge cases correctly.

CODE:



```python
def validate_email(email):
    import re
    pattern = r'^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,}$'
    if re.match(pattern, email):
        return "Valid Email"
    else:
        return "Invalid Email"
assert validate_email("test@example.com") == "Valid Email"
assert validate_email("invalid.email") == "Invalid Email"
assert validate_email("user@domain.co.uk") == "Valid Email"
assert validate_email("user@domain") == "Invalid Email"
assert validate_email("user@.com") == "Invalid Email"
print("All test cases passed!")
```

OUTPUT:



```
PS C:\Users\chvis\OneDrive\Desktop\ai> & C:/Python314/python.exe c:/Users/chvis/OneDrive/Desktop/ai/as
All test cases passed!
PS C:\Users\chvis\OneDrive\Desktop\ai>
```

## Task 5 (Perfect Number Checker – Test Case Design)

• Function: Check if a number is a perfect number (sum of divisors = number).

• Test Cases to Design:

o Normal case: 6 → True, 10 → False.

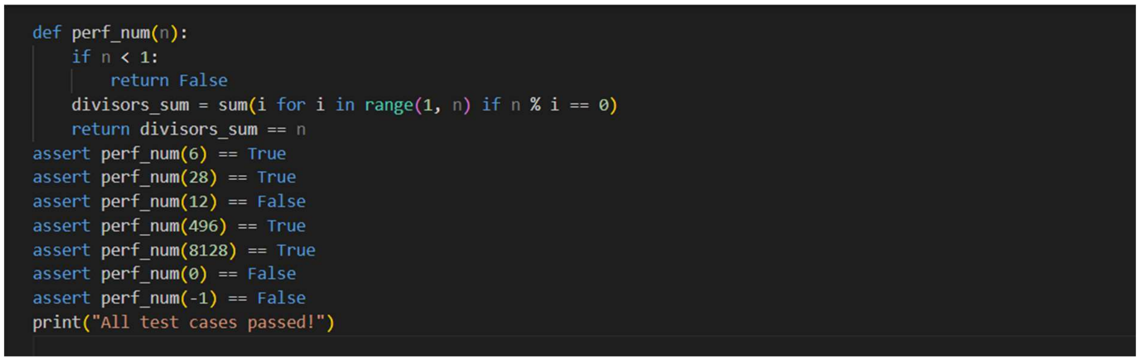
o Edge case: 1.

o Negative number case.

o Larger case: 28.

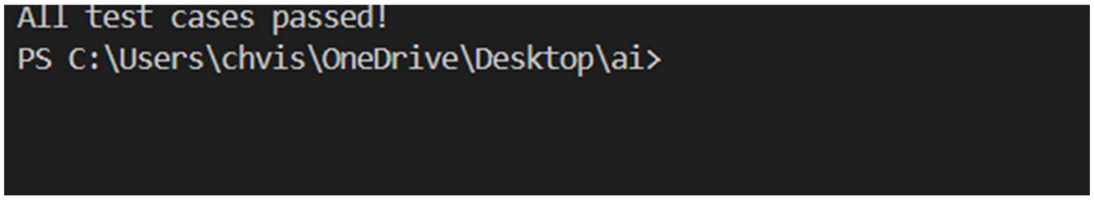
• Requirement: Validate correctness with assertions.

CODE:



```
def perf_num(n):
    if n < 1:
        return False
    divisors_sum = sum(i for i in range(1, n) if n % i == 0)
    return divisors_sum == n
assert perf_num(6) == True
assert perf_num(28) == True
assert perf_num(12) == False
assert perf_num(496) == True
assert perf_num(8128) == True
assert perf_num(0) == False
assert perf_num(-1) == False
print("All test cases passed!")
```

Output:



```
All test cases passed!
PS C:\Users\chvis\OneDrive\Desktop\ai>
```

**Task 6 (Abundant Number Checker – Test Case Design)**

• Function: Check if a number is abundant (sum of divisors > number).

• Test Cases to Design:

o Normal case: 12 → True, 15 → False.

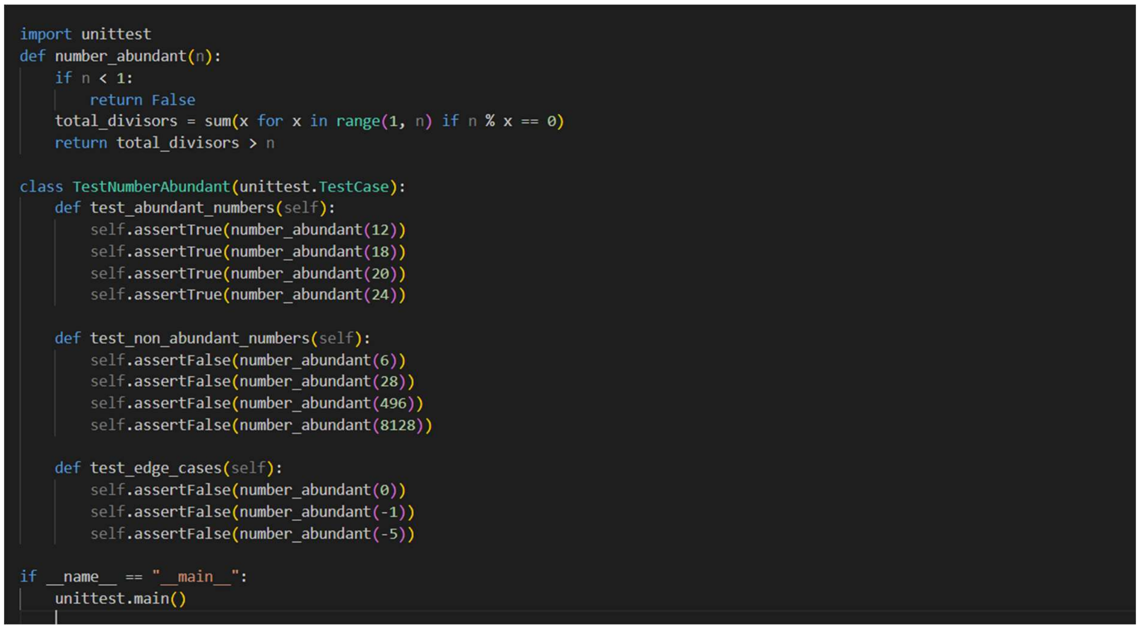
o Edge case: 1.

o Negative number case.

o Large case: 945.

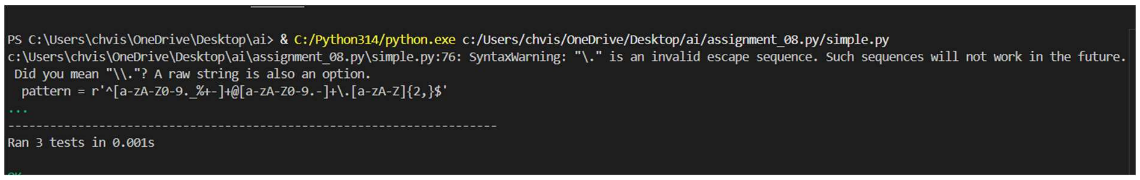
Requirement: Validate correctness with unittest

CODE:



```python
import unittest
def number_abundant(n):
    if n < 1:
        return False
    total_divisors = sum(x for x in range(1, n) if n % x == 0)
    return total_divisors > n

class TestNumberAbundant(unittest.TestCase):
    def test_abundant_numbers(self):
        self.assertTrue(number_abundant(12))
        self.assertTrue(number_abundant(18))
        self.assertTrue(number_abundant(20))
        self.assertTrue(number_abundant(24))

    def test_non_abundant_numbers(self):
        self.assertFalse(number_abundant(6))
        self.assertFalse(number_abundant(28))
        self.assertFalse(number_abundant(496))
        self.assertFalse(number_abundant(8128))

    def test_edge_cases(self):
        self.assertFalse(number_abundant(0))
        self.assertFalse(number_abundant(-1))
        self.assertFalse(number_abundant(-5))

if __name__ == "__main__":
    unittest.main()
```

OUTPUT:



```
PS C:\Users\chvis\OneDrive\Desktop\ai> & C:/Python314/python.exe c:/Users/chvis/OneDrive/Desktop/ai/assignment_08.py/simple.py
c:\Users\chvis\OneDrive\Desktop\ai\assignment_08.py\simple.py:76: SyntaxWarning: "\." is an invalid escape sequence. Such sequences will not work in the future.
 Did you mean "\\."? A raw string is also an option.
  pattern = r'^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,}$'
...
----------------------------------------------------------------------
Ran 3 tests in 0.001s
```

## Task 7 (Deficient Number Checker – Test Case Design)

• Function: Check if a number is deficient (sum of divisors < number).

• Test Cases to Design:

o Normal case: 8 → True, 12 → False.

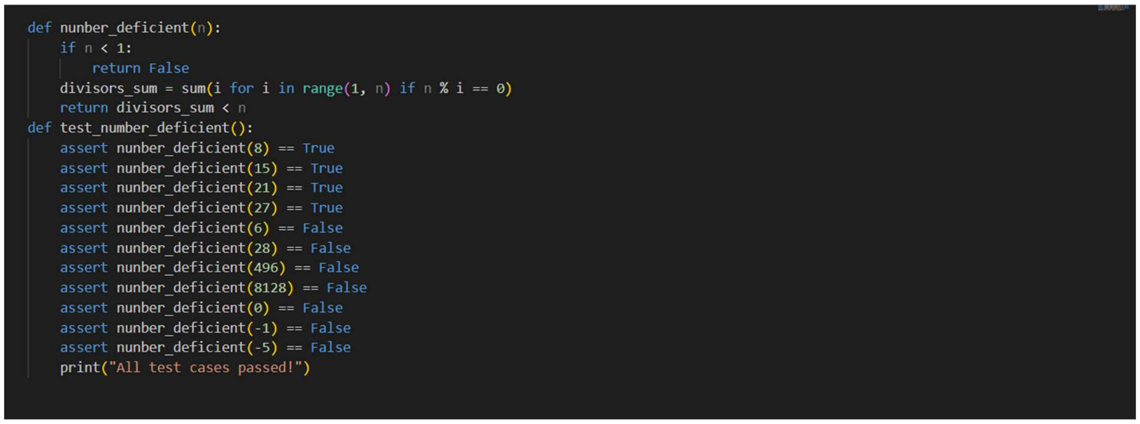
o Edge case: 1.

o Negative number case.

o Large case: 546.

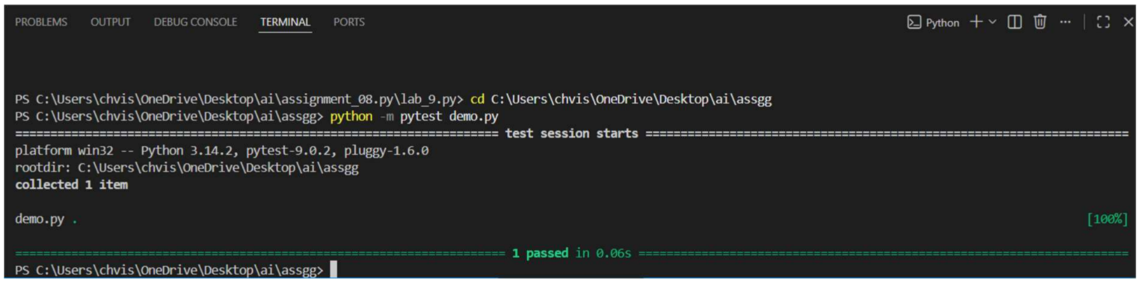
Requirement: Validate correctness with pytest.

CODE:



```python
def nunber_deficient(n):
    if n < 1:
        return False
    divisors_sum = sum(i for i in range(1, n) if n % i == 0)
    return divisors_sum < n
def test_number_deficient():
    assert nunber_deficient(8) == True
    assert nunber_deficient(15) == True
    assert nunber_deficient(21) == True
    assert nunber_deficient(27) == True
    assert nunber_deficient(6) == False
    assert nunber_deficient(28) == False
    assert nunber_deficient(496) == False
    assert nunber_deficient(8128) == False
    assert nunber_deficient(0) == False
    assert nunber_deficient(-1) == False
    assert nunber_deficient(-5) == False
    print("All test cases passed!")
```

OUTPUT:

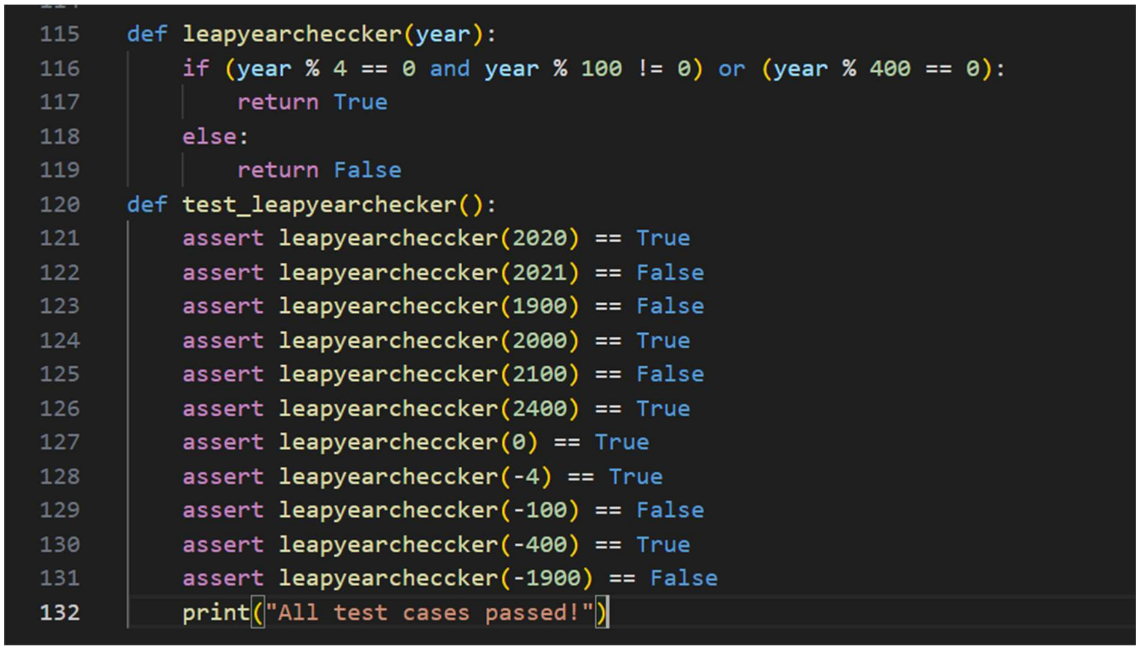


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\chvis\OneDrive\Desktop\ai\assignment_08.py\lab_9.py> cd C:\Users\chvis\OneDrive\Desktop\ai\assgg
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg> python -m pytest demo.py
======================================================================= test session starts =======================================================================
platform win32 -- Python 3.14.2, pytest-9.0.2, pluggy-1.6.0
rootdir: C:\Users\chvis\OneDrive\Desktop\ai\assgg
collected 1 item

demo.py .                                                                                                                                                    [100%]

======================================================================== 1 passed in 0.06s ========================================================================
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg>
```

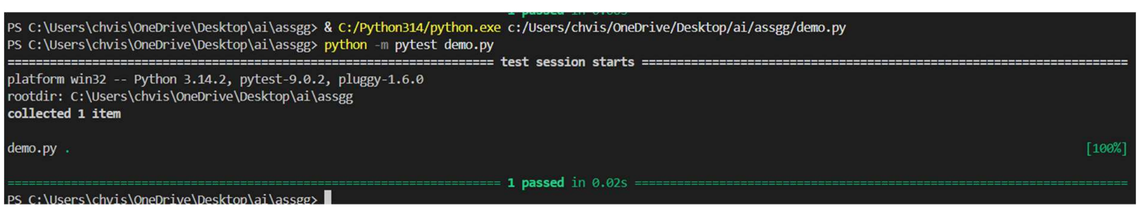
**Task 8 : Write a function LeapYearChecker and validate its implementation using 10 pytest test cases**

CODE:



```python
def leapyearcheccker(year):
    if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
        return True
    else:
        return False
def test_leapyearchecker():
    assert leapyearcheccker(2020) == True
    assert leapyearcheccker(2021) == False
    assert leapyearcheccker(1900) == False
    assert leapyearcheccker(2000) == True
    assert leapyearcheccker(2100) == False
    assert leapyearcheccker(2400) == True
    assert leapyearcheccker(0) == True
    assert leapyearcheccker(-4) == True
    assert leapyearcheccker(-100) == False
    assert leapyearcheccker(-400) == True
    assert leapyearcheccker(-1900) == False
    print("All test cases passed!")
```

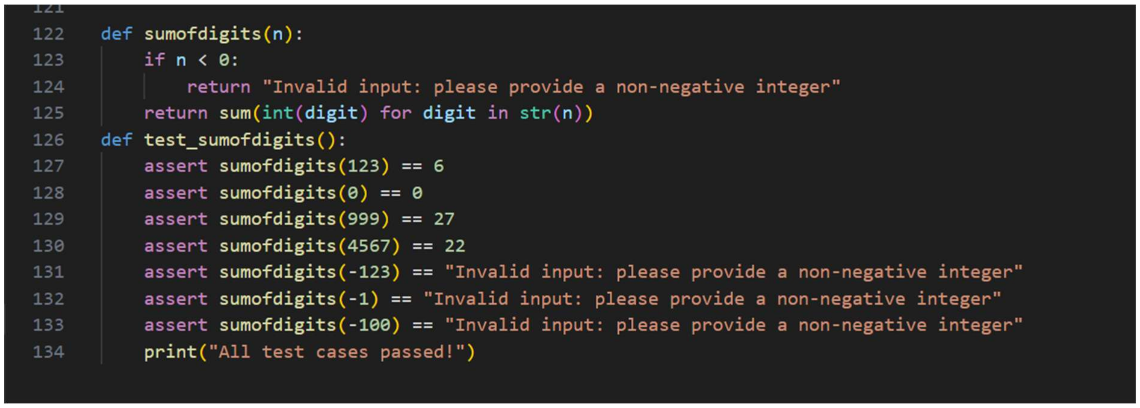
OUTPUT:



```
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg> & C:/Python314/python.exe c:/Users/chvis/OneDrive/Desktop/ai/assgg/demo.py
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg> python -m pytest demo.py
====================================================================== test session starts ======================================================================
platform win32 -- Python 3.14.2, pytest-9.0.2, pluggy-1.6.0
rootdir: C:\Users\chvis\OneDrive\Desktop\ai\assgg
collected 1 item

demo.py .                                                                                                                                                  [100%]

======================================================================= 1 passed in 0.02s =======================================================================
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg>
```

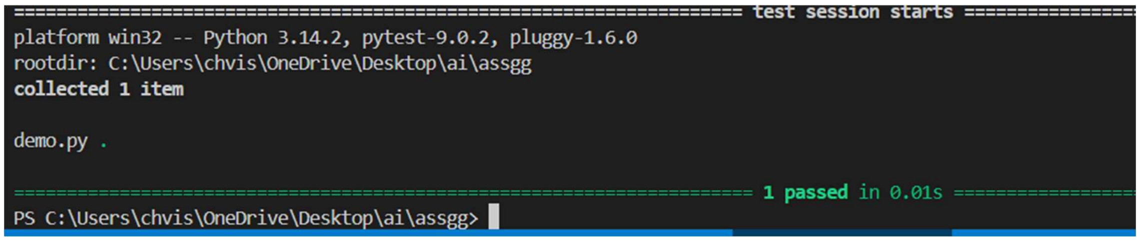
Task 9 : Write a function SumOfDigits and validate its implementation using 7 pytest test cases.

CODE:



```python
def sumofdigits(n):
    if n < 0:
        return "Invalid input: please provide a non-negative integer"
    return sum(int(digit) for digit in str(n))
def test_sumofdigits():
    assert sumofdigits(123) == 6
    assert sumofdigits(0) == 0
    assert sumofdigits(999) == 27
    assert sumofdigits(4567) == 22
    assert sumofdigits(-123) == "Invalid input: please provide a non-negative integer"
    assert sumofdigits(-1) == "Invalid input: please provide a non-negative integer"
    assert sumofdigits(-100) == "Invalid input: please provide a non-negative integer"
    print("All test cases passed!")
```

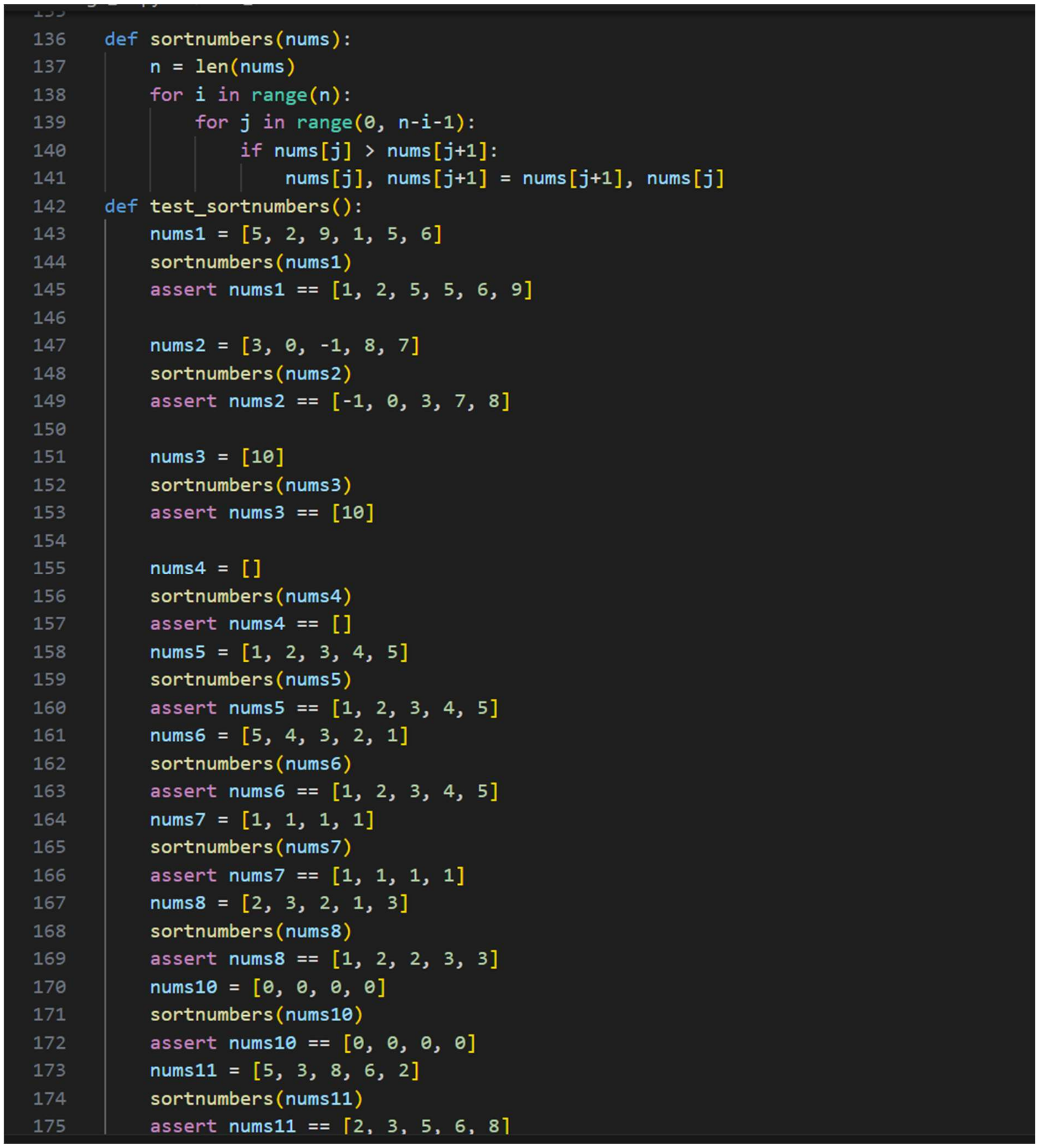
OUTPUT:



```
====================================================================== test session starts ================
platform win32 -- Python 3.14.2, pytest-9.0.2, pluggy-1.6.0
rootdir: C:\Users\chvis\OneDrive\Desktop\ai\assgg
collected 1 item

demo.py .

======================================================================= 1 passed in 0.01s =================
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg>
```

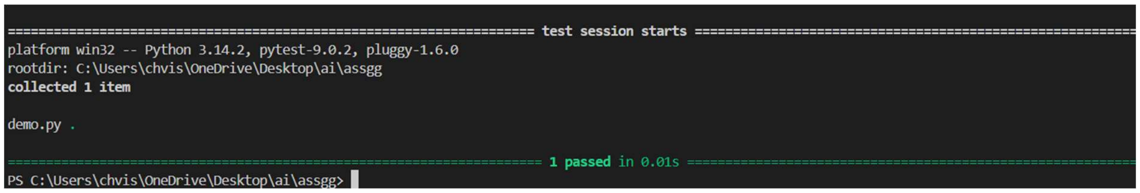
Task 10 : Write a function SortNumbers (implement bubble sort) and validate its implementation using 25 pytest test cases.

CODE:



```python
def sortnumbers(nums):
    n = len(nums)
    for i in range(n):
        for j in range(0, n-i-1):
            if nums[j] > nums[j+1]:
                nums[j], nums[j+1] = nums[j+1], nums[j]
def test_sortnumbers():
    nums1 = [5, 2, 9, 1, 5, 6]
    sortnumbers(nums1)
    assert nums1 == [1, 2, 5, 5, 6, 9]

    nums2 = [3, 0, -1, 8, 7]
    sortnumbers(nums2)
    assert nums2 == [-1, 0, 3, 7, 8]

    nums3 = [10]
    sortnumbers(nums3)
    assert nums3 == [10]

    nums4 = []
    sortnumbers(nums4)
    assert nums4 == []
    nums5 = [1, 2, 3, 4, 5]
    sortnumbers(nums5)
    assert nums5 == [1, 2, 3, 4, 5]
    nums6 = [5, 4, 3, 2, 1]
    sortnumbers(nums6)
    assert nums6 == [1, 2, 3, 4, 5]
    nums7 = [1, 1, 1, 1]
    sortnumbers(nums7)
    assert nums7 == [1, 1, 1, 1]
    nums8 = [2, 3, 2, 1, 3]
    sortnumbers(nums8)
    assert nums8 == [1, 2, 2, 3, 3]
    nums10 = [0, 0, 0, 0]
    sortnumbers(nums10)
    assert nums10 == [0, 0, 0, 0]
    nums11 = [5, 3, 8, 6, 2]
    sortnumbers(nums11)
    assert nums11 == [2, 3, 5, 6, 8]
```

OUTPUT:



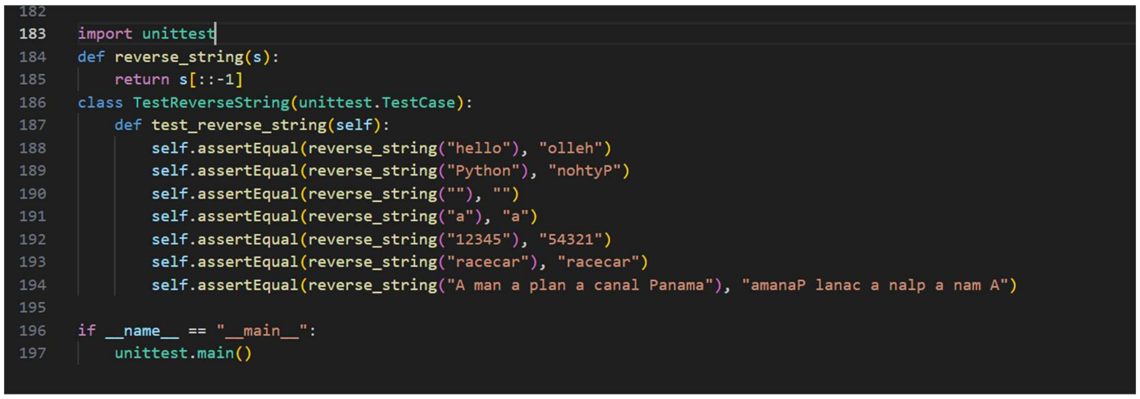
```
==================================================================== test session starts ==========================================================
platform win32 -- Python 3.14.2, pytest-9.0.2, pluggy-1.6.0
rootdir: C:\Users\chvis\OneDrive\Desktop\ai\assgg
collected 1 item

demo.py .

===================================================================== 1 passed in 0.01s ==========================================================
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg>
```

***Task 11 :***

Write a function ReverseString and validate its implementation

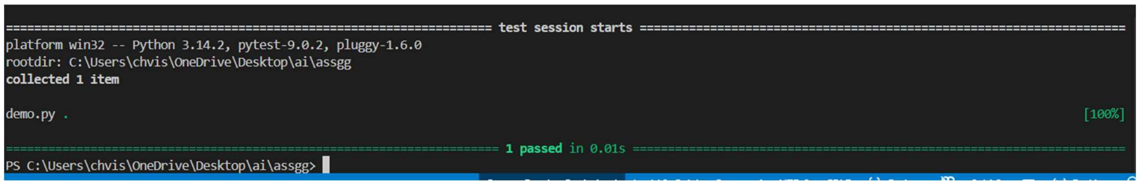
using 5 unittest test cases

CODE:



```python
import unittest
def reverse_string(s):
    return s[::-1]
class TestReverseString(unittest.TestCase):
    def test_reverse_string(self):
        self.assertEqual(reverse_string("hello"), "olleh")
        self.assertEqual(reverse_string("Python"), "nohtyP")
        self.assertEqual(reverse_string(""), "")
        self.assertEqual(reverse_string("a"), "a")
        self.assertEqual(reverse_string("12345"), "54321")
        self.assertEqual(reverse_string("racecar"), "racecar")
        self.assertEqual(reverse_string("A man a plan a canal Panama"), "amanaP lanac a nalp a nam A")

if __name__ == "__main__":
    unittest.main()
```

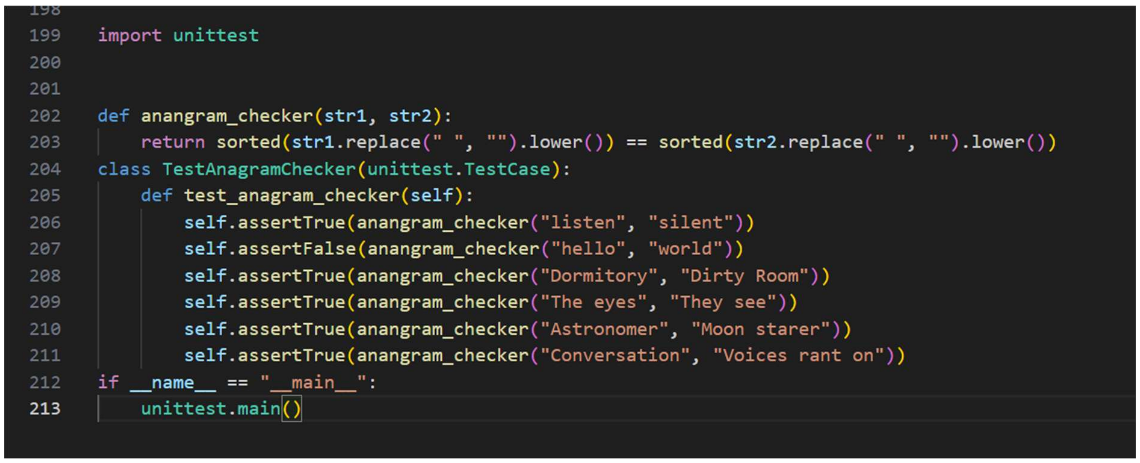
OUTPUT:



```
========================================================================= test session starts ==========================================================================
platform win32 -- Python 3.14.2, pytest-9.0.2, pluggy-1.6.0
rootdir: C:\Users\chvis\OneDrive\Desktop\ai\assgg
collected 1 item

demo.py .                                                                                                                                                        [100%]

========================================================================== 1 passed in 0.01s ===========================================================================
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg>
```

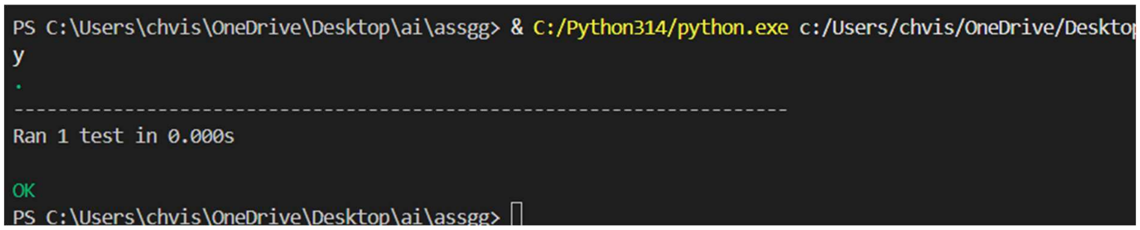
***Task 12 :*** Write a function AnagramChecker and validate its implementation using 10 unittest test cases.

CODE:



```python
import unittest


def anangram_checker(str1, str2):
    return sorted(str1.replace(" ", "").lower()) == sorted(str2.replace(" ", "").lower())
class TestAnagramChecker(unittest.TestCase):
    def test_anagram_checker(self):
        self.assertTrue(anangram_checker("listen", "silent"))
        self.assertFalse(anangram_checker("hello", "world"))
        self.assertTrue(anangram_checker("Dormitory", "Dirty Room"))
        self.assertTrue(anangram_checker("The eyes", "They see"))
        self.assertTrue(anangram_checker("Astronomer", "Moon starer"))
        self.assertTrue(anangram_checker("Conversation", "Voices rant on"))
if __name__ == "__main__":
    unittest.main()
```

OUTPUT:

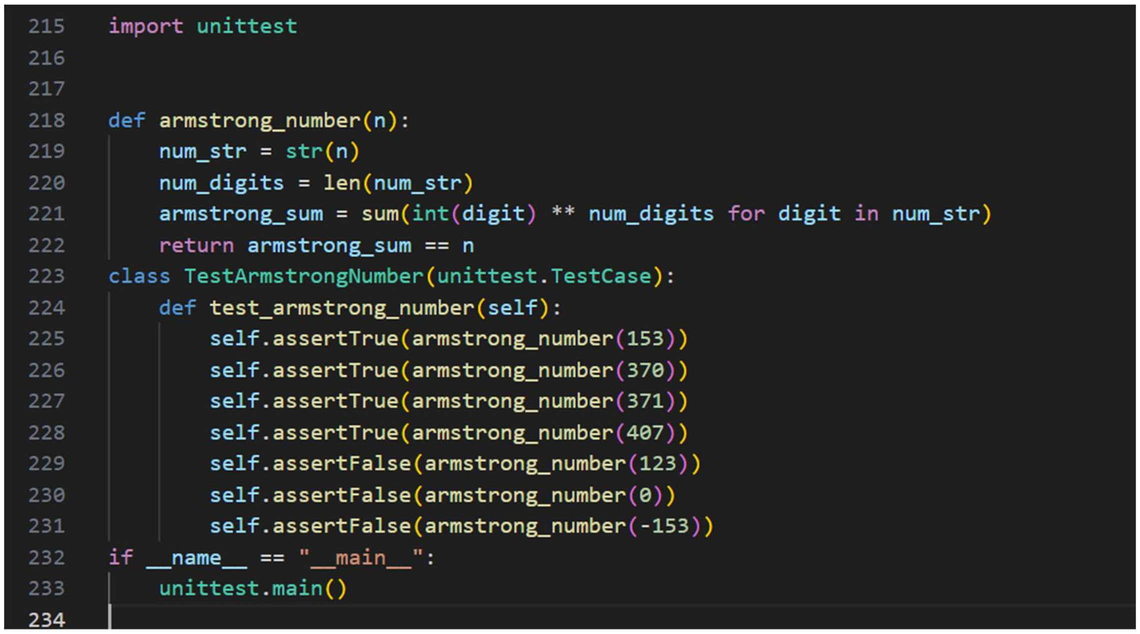


```
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg> & C:/Python314/python.exe c:/Users/chvis/OneDrive/Deskto
y
.
----------------------------------------------------------------------
Ran 1 test in 0.000s

OK
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg>
```

***Task 13 :***

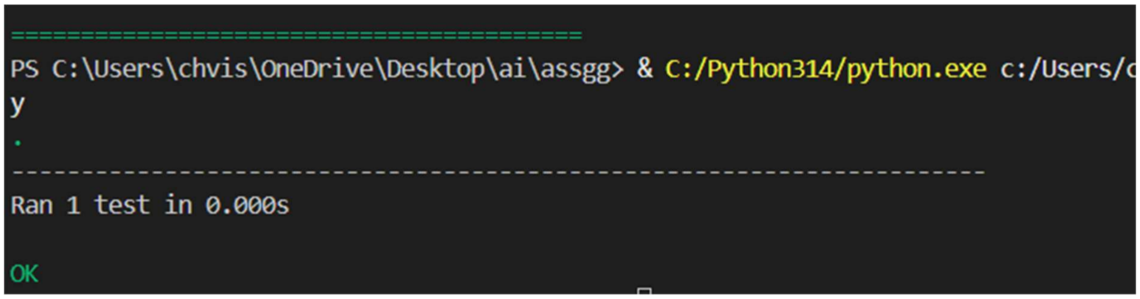
Write a function ArmstrongChecker and validate its implementation

using 8 unittest test cases.



```python
import unittest


def armstrong_number(n):
    num_str = str(n)
    num_digits = len(num_str)
    armstrong_sum = sum(int(digit) ** num_digits for digit in num_str)
    return armstrong_sum == n
class TestArmstrongNumber(unittest.TestCase):
    def test_armstrong_number(self):
        self.assertTrue(armstrong_number(153))
        self.assertTrue(armstrong_number(370))
        self.assertTrue(armstrong_number(371))
        self.assertTrue(armstrong_number(407))
        self.assertFalse(armstrong_number(123))
        self.assertFalse(armstrong_number(0))
        self.assertFalse(armstrong_number(-153))
if __name__ == "__main__":
    unittest.main()

```

OUTPUT:



```
==========================================
PS C:\Users\chvis\OneDrive\Desktop\ai\assgg> & C:/Python314/python.exe c:/Users/c
y
.
----------------------------------------------------------------------
Ran 1 test in 0.000s

OK
```