

# 2303A51940

## Batch-25

### Assignment-8.4

#### Task 1: Developing a Utility Function Using TDD

##### Scenario

You are working on a small utility library for a larger software system. One of the required functions should calculate the square of a given number, and correctness is critical because other modules depend on it.

##### Task Description

Following the Test Driven Development (TDD) approach:

1. First, write unit test cases to verify that a function correctly returns the square of a number for multiple inputs.
2. After defining the test cases, use GitHub Copilot or Cursor AI to generate the function implementation so that all tests pass.

Ensure that the function is written only after the tests are created.

##### Expected Outcome

- A separate test file and implementation file
- Clearly written test cases executed before implementation
- AI-assisted function implementation that passes all tests
- Demonstration of the TDD cycle: test → fail → implement → pass

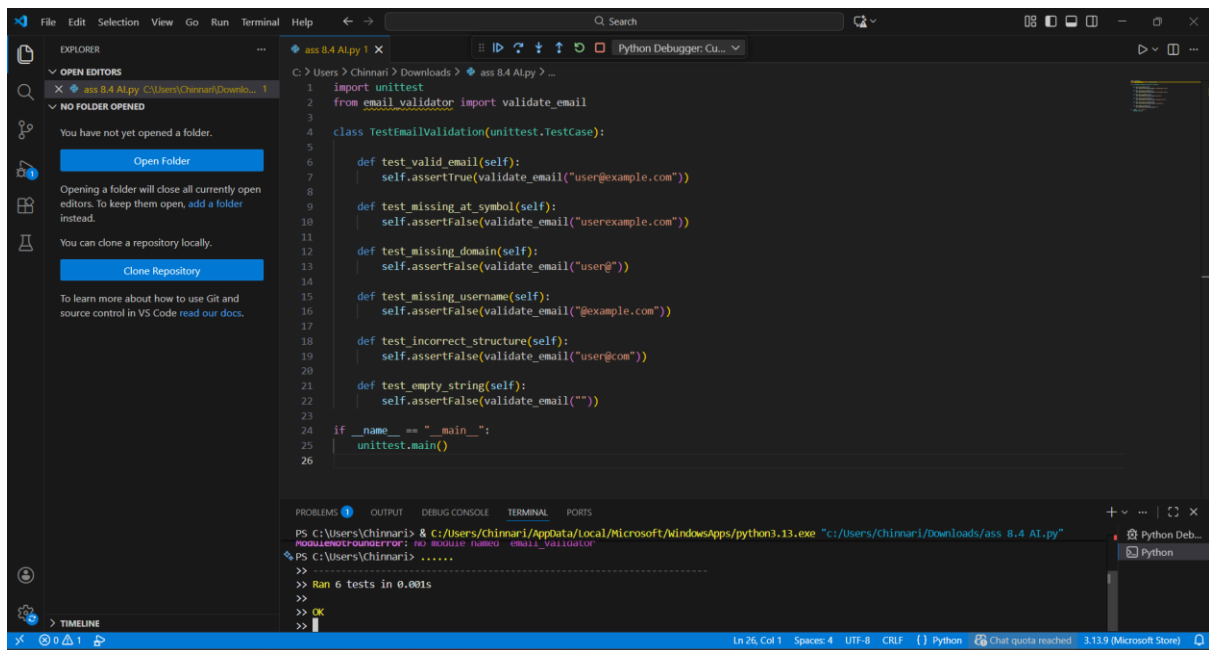
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test (1).csv Python Debugger: Cu...  
C:\Users> Chinnari > .py > ...  
1 import unittest  
2 def square(n):  
3     """Calculates the square of a number."""  
4     return n * n  
5  
6  
7 class TestSquare(unittest.TestCase):  
8  
9     def test_positive(self):  
10         self.assertEqual(square(10), 100)  
11  
12     def test_zero(self):  
13         self.assertEqual(square(0), 0)  
14  
15     def test_negative(self):  
16         # Result should be positive  
17         self.assertEqual(square(-6), 36)  
18  
19     def test_float(self):  
20         self.assertEqual(square(2.5), 6.25)  
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```

2. Using AI assistance to implement the `validate_email()` function based strictly on the behavior described by the test cases.

The implementation should be driven entirely by the test expectations.

Expected Outcome

- Well-defined unit tests using `unittest` or `pytest`
- An AI-generated email validation function
- All test cases passing successfully
- Clear alignment between test cases and function behavior



```
1 import unittest
2 from email_validator import validate_email
3
4 class TestEmailValidation(unittest.TestCase):
5
6     def test_valid_email(self):
7         self.assertTrue(validate_email("user@example.com"))
8
9     def test_missing_at_symbol(self):
10        self.assertFalse(validate_email("userexample.com"))
11
12    def test_missing_domain(self):
13        self.assertFalse(validate_email("user@"))
14
15    def test_missing_username(self):
16        self.assertFalse(validate_email("@example.com"))
17
18    def test_incorrect_structure(self):
19        self.assertFalse(validate_email("user@com"))
20
21    def test_empty_string(self):
22        self.assertFalse(validate_email(""))
23
24 if __name__ == "__main__":
25     unittest.main()
26
```

```
PS C:\Users\Chinnari> & C:\Users\Chinnari\AppData\local\Microsoft\WindowsApps\python3.13.exe "C:\Users\Chinnari\Downloads\ass 8.4 Alpy 1.py"
ModuleNotFoundError: No module named 'email_validator'
PS C:\Users\Chinnari> .....
>> Ran 6 tests in 0.001s
>> OK
```

## Task 3: Decision Logic Development Using TDD

### Scenario

In a grading or evaluation module, a function is required to determine the maximum value among three inputs. Accuracy is essential, as incorrect results could affect downstream decision logic.

### Task Description

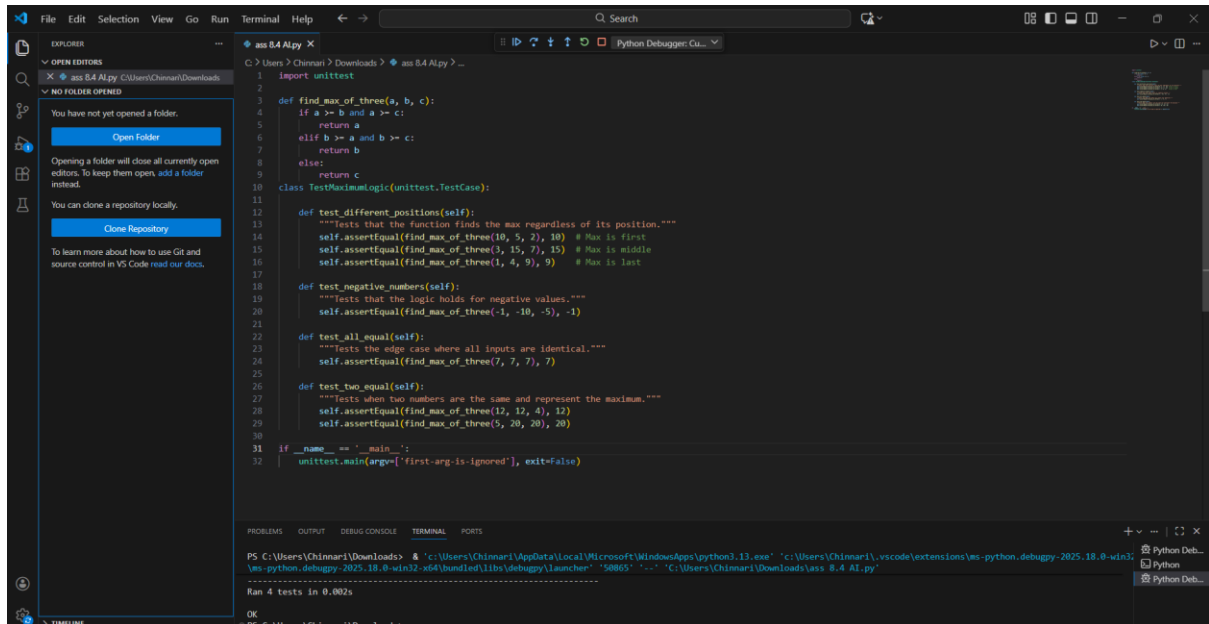
Using the TDD methodology:

1. Write test cases that describe the expected output for different combinations of three numbers.
2. Prompt GitHub Copilot or Cursor AI to implement the function logic based on the written tests.

Avoid writing any logic before test cases are completed.

## Expected Outcome

- Comprehensive test cases covering normal and edge cases
- AI-generated function implementation
- Passing test results demonstrating correctness
- Evidence that logic was derived from tests, not assumptions



```
1 import unittest
2
3 def find_max_of_three(a, b, c):
4     if a >= b and a >= c:
5         return a
6     elif b >= a and b >= c:
7         return b
8     else:
9         return c
10
11 class TestMaximumLogic(unittest.TestCase):
12
13     def test_different_positions(self):
14         """Tests that the function finds the max regardless of its position."""
15         self.assertEqual(find_max_of_three(10, 5, 2), 10) # Max is first
16         self.assertEqual(find_max_of_three(3, 15, 7), 15) # Max is middle
17         self.assertEqual(find_max_of_three(1, 4, 9), 9) # Max is last
18
19     def test_negative_numbers(self):
20         """Tests that the logic holds for negative values."""
21         self.assertEqual(find_max_of_three(-1, -10, -5), -1)
22
23     def test_all_equal(self):
24         """Tests the edge case where all inputs are identical."""
25         self.assertEqual(find_max_of_three(7, 7, 7), 7)
26
27     def test_two_equal(self):
28         """Tests when two numbers are the same and represent the maximum."""
29         self.assertEqual(find_max_of_three(12, 12, 4), 12)
30         self.assertEqual(find_max_of_three(5, 20, 20), 20)
31
32 if __name__ == '__main__':
33     unittest.main(argv=['first-arg-is-ignored'], exit=False)
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS C:\Users\Chinnari\Downloads> python -m unittest  
Ran 4 tests in 0.002s

## Task 4: Shopping Cart Development with AI-Assisted TDD

### Scenario

You are building a simple shopping cart module for an e-commerce application. The cart must support adding items, removing items, and calculating the total price accurately.

### Task Description

Follow a test-driven approach:

1. Write unit tests for each required behavior:

- o Adding an item
- o Removing an item
- o Calculating the total price

2. After defining all tests, use AI tools to generate the ShoppingCart class and its methods so that the tests pass.

Focus on behavior-driven testing rather than implementation details.

## Expected Outcome

- Unit tests defining expected shopping cart behavior
- AI-generated class implementation
- All tests passing successfully
- Clear demonstration of TDD applied to a class-based design

```

1  #!/usr/bin/env python
2  """
3  """
4  import re
5
6  def validate_email(email):
7      """
8      # Valid email format: [a-zA-Z0-9_!@#$%^&*~.-]+@[a-zA-Z0-9-]+\.[a-zA-Z]{2,}
9      """
10     pattern = r'^[a-zA-Z0-9_!@#$%^&*~.-]+@[a-zA-Z0-9-]+\.[a-zA-Z]{2,}$'
11
12     if re.match(pattern, email):
13         return True
14     else:
15         return False
16
17 class TestUserRegistrationEmail(unittest.TestCase):
18
19     def test_valid_email(self):
20         """Valid format should pass"""
21         self.assertTrue(validate_email("new_user@registration.com"))
22
23     def test_missing_at_symbol(self):
24         """Invalid: No @ symbol"""
25         self.assertFalse(validate_email("userdomain.com"))
26
27     def test_missing_domain(self):
28         """Invalid: Nothing after @"""
29         self.assertFalse(validate_email("user@"))
30
31     def test_missing_username(self):
32         """Invalid: Nothing before @"""
33         self.assertFalse(validate_email("@registration.com"))
34
35     def test_incorrect_structure(self):
36         """Invalid: Multiple @ symbols or missing dot"""
37         self.assertFalse(validate_email("user@domain.com"))
38         self.assertFalse(validate_email("user@domaincom"))
39
40 if __name__ == '__main__':
41     # unittest allows the script to finish and show output in VS Code terminal
42     unittest.main(argv=['first-arg-is-ignored'], exit=False)
43
44 # Run tests
45 python -m unittest discover
46
47 Ran 4 tests in 0.002s
48
49 OK
50
51 PS C:\Users\Chinnari\Downloads>

```

## Task 5: String Validation Module Using TDD

### Scenario

You are working on a text-processing module where a function is required to identify whether a given string is a palindrome. The function must handle different cases and inputs reliably.

### Task Description

Using Test Driven Development:

1. Write test cases for a palindrome checker covering:

- o Simple palindromes
- o Non-palindromes
- o Case variations

2. Use GitHub Copilot or Cursor AI to generate the `is_palindrome()` function based on the test case expectations.

The function should be implemented only after tests are written.

### Expected Outcome

- Clearly written test cases defining expected behavior

- AI-assisted implementation of the palindrome checker
- All test cases passing successfully
- Evidence of TDD methodology applied correctly

```

1 import unittest
2
3 class TestPalindromeChecker(unittest.TestCase):
4
5     def test_simple_palindrome(self):
6         self.assertTrue(is_palindrome("madam"))
7
8     def test_non_palindrome(self):
9         self.assertFalse(is_palindrome("hello"))
10
11     def test_case_variation_palindrome(self):
12         self.assertTrue(is_palindrome("Madam"))
13
14     def test_single_character(self):
15         self.assertTrue(is_palindrome("a"))
16
17     def test_empty_string(self):
18         self.assertTrue(is_palindrome(""))
19
20 def is_palindrome(text):
21     normalized_text = text.lower()
22     return normalized_text == normalized_text[::-1]
23
24 if __name__ == "__main__":
25     unittest.main()
26

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS C:\Users\Chinnari\Downloads> cd 'c:\Users\Chinnari\Downloads'; & 'c:\Users\Chinnari\AppData\Local\Microsoft\WindowsApps\python3.13.exe' 'c:\Users\Chinnari\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle\libs\debugpy\launcher' '61176' '-c' 'C:\Users\Chinnari\Downloads\ass\_8.4\_AI.py'

OK

PS C:\Users\Chinnari\Downloads> cd 'c:\Users\Chinnari\'; & 'c:\Users\Chinnari\AppData\Local\Microsoft\WindowsApps\python3.13.exe' 'c:\Users\Chinnari\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle\libs\debugpy\launcher' '58112' '-c' 'C:\Users\Chinnari\py'