

## Lab Assignment # 08

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

#### **Task Description #1 (Password Strength Validator – Apply AI in Security Context)**

- Task: Apply AI to generate at least 3 assert test cases for `is_strong_password(password)` and implement the validator function.

- Requirements:

- o Password must have at least 8 characters.
- o Must include uppercase, lowercase, digit, and special character.
- o Must not contain spaces.

#### **Example Assert Test Cases:**

```
assert is_strong_password("Abcd@123") == True  
assert is_strong_password("abcd123") == False  
assert is_strong_password("ABCD@1234") == True
```

#### **Expected Output #1:** • Password validation logic passing all AI-generated test cases.

#### **Output Screenshot:**

The screenshot shows the VS Code interface with the title bar "AI\_Assisted\_lab". The Explorer sidebar on the left lists files like "task01.py", "task03.py", "task04.py", "task05.py", and "task02.py". The main editor area contains the following Python code:

```

lab8.1 > task01.py > ...
1 # Generate at least 5 assert-based test cases for a function:
2 # def is_strong_password(password):
3 # Requirements:
4 # - At least 8 characters
5 # - Must contain uppercase letter
6 # - Must contain lowercase letter
7 # - Must contain digit
8 # - Must contain special character
9 # - Must not contain spaces
10 # Include edge cases such as:
11 # - Empty string
12 # - Only digits
13 # - Only uppercase
14 # - Password with spaces
15 # - Exactly 8 characters valid case
16 # Return only assert statements.
17 # Now implement the Python function:
18 # def is_strong_password(password):
19 # Make sure it passes all previously generated test cases.
20 # Use clean logic and proper condition checking.
21 # Do not use external libraries.
22 def is_strong_password(password):
23     if not isinstance(password, str):
24         return False
25
26     if len(password) < 8:
27         return False
28
29     if '' in password:
30         return False
31
32     if not any(char.isupper() for char in password):
33         return False
34
35     if not any(char.islower() for char in password):
36         return False
37
38     if not any(char.isdigit() for char in password):
39         return False
40
41     if not any(char in "!@#$%^&*()_-+=[]{}|;:'\".,>?/" for char in password):
42         return False
43

```

The status bar at the bottom indicates "Ln 18, Col 36 Spaces: 4 UTF-8 LF () Python 3.9.6".

The screenshot shows the VS Code interface with the title bar "AI\_Assisted\_lab". The Explorer sidebar lists files including "task01.py". The main editor area contains the following Python code:

```

lab8.1 > task01.py > ...
47 # Test Cases
48 assert is_strong_password("Password123!") == True
49 assert is_strong_password("") == False
50 assert is_strong_password("12345678") == False
51 assert is_strong_password("PASSWORD") == False
52 assert is_strong_password("Pass word!") == False
53 assert is_strong_password("Passw1!") == False
54 assert is_strong_password("Passw0rd!") == True
55 assert is_strong_password("P@ssw0rd") == True
56 assert is_strong_password("P@ss w0rd") == False
57 assert is_strong_password("P@sssw0") == False
58
59 print("All test cases passed successfully ✅")
60
61 # Analyze the password validation function.
62 # Suggest improvements for:
63 # - Readability
64 # - Security
65 # - Edge case handling
66 # - Performance
67
68 # Explain briefly.
69 # The function is_strong_password is straightforward and checks all the required conditions for a strong password.
70 # Improvements:

```

The terminal below shows the command-line output:

```

/usr/bin/python3 /Users/anumandlarithika/SRU/AI_Assisted_lab/lab8.1/task01.py
anumandlarithika@ANUMANDLAs-MacBook-Air ~ % /usr/bin/python3 /Users/anumandlarithika/SRU/AI_Assisted_lab/lab8.1/task01.py
All test cases passed successfully ✅
anumandlarithika@ANUMANDLAs-MacBook-Air ~ %

```

The status bar at the bottom indicates "Ln 18, Col 36 Spaces: 4 UTF-8 LF () Python 3.9.6".

**Explanation:** This checks if a password is truly “strong” by making sure it has the right mix of characters and no spaces.

## Task Description #2 (Number Classification with Loops – Apply AI for Edge Case Handling)

- **Task:** Use AI to generate at least 3 assert test cases for a `classify_number(n)` function. Implement using loops.

• Requirements.

- o Classify numbers as Positive, Negative, or Zero.
- o Handle invalid inputs like strings and None.
- o Include boundary conditions (-1, 0, 1).

### Example Assert Test Cases:

```
assert classify_number(10) == "Positive"
assert classify_number(-5) == "Negative"
assert classify_number(0) == "Zero"
```

### Expected Output #2:

- Classification logic passing all assert tests.

### Output Screenshot:

The screenshot shows a code editor interface with the title bar 'Ai\_Assisted\_Lab'. The left sidebar is the 'EXPLORER' view, showing a file tree with various Python files and PDF documents. The main area is a code editor displaying a Python script named 'task02.py'. The code defines a function 'classify\_number(n)' that returns 'Positive' for n > 0, 'Negative' for n < 0, and 'Zero' for n == 0. It handles invalid inputs like strings and None by returning 'Invalid input'. The script then runs several assert statements to check the function's behavior across different input types and values. At the bottom, it prints a success message if all test cases pass. The status bar at the bottom right indicates the code is in Python mode, version 3.9.6, with 14 lines and 26 columns.

```
lab8.1 > task02.py > ...
1  # Generate at least 5 assert-based test cases for:
2  # def classify_number(n):
3  # Requirements:
4  # - Return "Positive" if n > 0
5  # - Return "Negative" if n < 0
6  # - Return "Zero" if n == 0
7  # - Handle invalid inputs (string, None, float)
8  # Include boundary values:
9  # -1
10 # -0
11 # -1
12 # Return only assert statements.
13 # Write the function:
14 # def classify_number(n):
15 # Requirements:
16 # - Use loop-based logic wherever applicable
17 # - Handle invalid inputs properly
18 # - Return correct classification
19 # - No external libraries
20 def classify_number(n):
21     if not isinstance(n, (int, float)):
22         return "Invalid input"
23
24     if n > 0:
25         return "Positive"
26     elif n < 0:
27         return "Negative"
28     else:
29         return "Zero"
30
31 # Test Cases
32 assert classify_number(10) == "Positive"
33 assert classify_number(-5) == "Negative"
34 assert classify_number(0) == "Zero"
35 assert classify_number("string") == "Invalid input"
36 assert classify_number(None) == "Invalid input"
37 assert classify_number(3.14) == "Positive"
38 assert classify_number(-2.71) == "Negative"
39 print("All test cases passed successfully ✅")
40
41 # Analyze whether the generated test cases fully cover:
42 # - Boundary cases
43 # - Invalid inputs
44 # - Type checking
```

```

EXPLORER ... task01.py task03.py task04.py task05.py task02.py
AI_ASSISTED_LAB
> lab01
> lab1.3
> lab2.1
> lab3.1
> lab4.1
> lab5.1
> lab6.3
> lab7.1
> lab7.5
lab8.1
task01.py
task02.py <-- Selected
task03.py
task04.py
task05.py
> Labtests
Ai_Ass-7.1_4048.pdf
Ai_LAB-01_4048.pdf
Ai_LAB02_4048.pdf
Ai_LAB03_4048.pdf
Ai_LAB03_4065.pdf
fibonacci_no_function.pdf
HPC-7.5_4048.pdf
Lab_Assignment_5.1...
practice.py
user_info.txt

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
/usr/bin/python3 /Users/anumandararithika/SRU/AI_Assisted_lab/lab8.1/task02.py
● anumandararithika@NUMANDLAS-MacBook-Air Ai_Assisted_lab % /usr/bin/python3 /Users/anumandararithika/SRU/AI_Assisted_lab/lab8.1/task02.py
All test cases passed successfully ✅
● anumandararithika@NUMANDLAS-MacBook-Air Ai_Assisted_lab %

```

Ln 14, Col 26 Spaces: 4 UTF-8 LF {} Python 3.9.6

**Explanation:** This sorts numbers into positive, negative, or zero, while politely rejecting anything that isn't a number.

### Task Description #3 (Anagram Checker – Apply AI for String Analysis)

- Task: Use AI to generate at least 3 assert test cases for `is_anagram(str1, str2)` and implement the function.

- Requirements:
  - o Ignore case, spaces, and punctuation.
  - o Handle edge cases (empty strings, identical words).

#### Example Assert Test Cases:

```

assert is_anagram("listen", "silent") == True
assert is_anagram("hello", "world") == False
assert is_anagram("Dormitory", "Dirty Room") == True

```

**Expected Output #3:** • Function correctly identifying anagrams and passing all AI-generated tests.

#### Output Screenshot:

The screenshot shows a VS Code interface with the following details:

- EXPLORER**: Shows the project structure under "AI\_ASSISTED\_LAB". Files include lab01 through lab8.1, task01.py, task02.py, task03.py (selected), task04.py, task05.py, and user\_info.txt.
- CODE**: The content of task03.py is displayed:

```

1  # Generate at least 6 assert-based test cases for:
2  # def is_anagram(str1, str2):
3  # Requirements:
4  # - Ignore case
5  # - Ignore spaces
6  # - Ignore punctuation
7  # - Handle empty strings
8  # - Handle identical words
9  # Include both positive and negative cases.
10 # Return only assert statements.
11 # Write a clean Python implementation for:
12 # def is_anagram(str1, str2):
13 # Requirements:
14 # - Ignore case differences
15 # - Remove spaces
16 # - Remove punctuation
17 # - Handle empty input safely
18 # - No external libraries!
19 # Ensure all test cases pass.
20 def is_anagram(str1, str2):
21     def clean_string(s):
22         return ''.join(char.lower() for char in s if char.isalnum())
23
24     cleaned_str1 = clean_string(str1)
25     cleaned_str2 = clean_string(str2)
26
27     return sorted(cleaned_str1) == sorted(cleaned_str2)
28
29 # Test Cases
30 assert is_anagram("Listen", "Silent") == True
31 assert is_anagram("Triangle", "Integral") == True
32 assert is_anagram("Dormitory", "Dirty Room") == True
33 assert is_anagram("Hello", "World") == False
34 assert is_anagram("", "") == True
35 assert is_anagram("A", "a") == True
36 assert is_anagram("Nag a ram", "Nag a ram") == True
37 assert is_anagram("Test", "Best") == False
38 print("All test cases passed successfully ✅")

```
- TERMINAL**: Shows the command-line output of running task03.py:

```

/usr/bin/python3 /Users/anumandararithika/SRU/AI_Assisted_lab/lab8.1/task03.py
anumandararithika@ANUMANDLA-MacBook-Air AI_Assisted_lab % /usr/bin/python3 /Users/anumandararithika/SRU/AI_Assisted_lab/lab8.1/task03.py
All test cases passed successfully ✅
anumandararithika@ANUMANDLA-MacBook-Air AI_Assisted_lab %

```

**Explanation:** This spots whether two words or phrases are made of the same letters, ignoring case, spaces, and punctuation.

## Task Description #4 (Inventory Class – Apply AI to Simulate Real- World Inventory System)

- Task: Ask AI to generate at least 3 assert-based tests for an Inventory class with stock management.

- Methods:
  - o add\_item(name, quantity)
  - o remove\_item(name, quantity)
  - o get\_stock(name)

### Example Assert Test Cases:

```
inv = Inventory()
```

```

inv.add_item("Pen", 10)
assert inv.get_stock("Pen") == 10
inv.remove_item("Pen", 5)
assert inv.get_stock("Pen") == 5
inv.add_item("Book", 3)
assert inv.get_stock("Book") == 3

```

### Expected Output #4: • Fully functional class passing all assertions.

### Output Screenshot:

```

EXPLORER ... task01.py task03.py task04.py ● task05.py task02.py
lab8.1 > task04.py ...
1 # Generate at least 6 assert-based test cases for an Inventory class with:
2 # - Methods:
3 # - add_item(name, quantity)
4 # - remove_item(name, quantity)
5 # - get_stock(name)
6 # Test:
7 # - Adding new item
8 # - Removing items
9 # - Removing more than stock
10 # - Getting stock of non-existing item
11 # - Adding duplicate items
12 # - Negative quantity handling
13 # Return only assert statements.
14 # Write a clean and robust Python class:
15 # class Inventory:
16 # Include:
17 # - Internal dictionary for storage
18 # - Proper validation
19 # - Error handling for invalid operations
20 # - Prevent negative stock
21 # Ensure it passes all tests.
22 class Inventory:
23     def __init__(self):
24         self.stock = {}
25
26     def add_item(self, name, quantity):
27         if not isinstance(name, str) or not isinstance(quantity, int):
28             raise TypeError("Invalid input type")
29
30         if quantity <= 0:
31             raise ValueError("Quantity must be positive")
32
33         if name in self.stock:
34             self.stock[name] += quantity
35         else:
36             self.stock[name] = quantity
37
38     def remove_item(self, name, quantity):
39         if name not in self.stock:
40             raise KeyError("Item does not exist")
41
42         if quantity <= 0:
43             raise ValueError("Quantity must be positive")
44
45
46
47
48
49
50
51
52
53
54 # TestCases :
55 inventory = Inventory()
56 # Add items
57 inventory.add_item("Pen", 10)
58 assert inventory.get_stock("Pen") == 10
59 inventory.add_item("Pen", 5)
60 assert inventory.get_stock("Pen") == 15
61 inventory.add_item("Book", 3)
62 assert inventory.get_stock("Book") == 3
63 # Remove items
64 inventory.remove_item("Pen", 5)
65 assert inventory.get_stock("Pen") == 10
66 # Remove more than available
67 try:
68     inventory.remove_item("Pen", 20)
69 except ValueError as e:
70     assert e.args[0] == "Insufficient stock"
71 # Remove non-existing item
72 try:
73     inventory.remove_item("Banana", 1)
74 except KeyError as e:
75     assert e.args[0] == "Item does not exist"
76 # Negative quantity add
77 try:
78     inventory.add_item("Pencil", -5)
79 except ValueError as e:
80     assert e.args[0] == "Quantity must be positive"
81 # Negative quantity remove
82 try:
83     inventory.remove_item("Pen", -2)
84 except ValueError as e:
85     assert e.args[0] == "Quantity must be positive"
86 print("All Inventory test cases passed successfully ✅")
87
88
89
90 # Suggest improvements for this Inventory class in terms of:

```

```

EXPLORER ... task01.py task03.py task04.py X task05.py ● task02.py
lab8.1 > task04.py ...
52
53
54 # TestCases :
55 inventory = Inventory()
56 # Add items
57 inventory.add_item("Pen", 10)
58 assert inventory.get_stock("Pen") == 10
59 inventory.add_item("Pen", 5)
60 assert inventory.get_stock("Pen") == 15
61 inventory.add_item("Book", 3)
62 assert inventory.get_stock("Book") == 3
63 # Remove items
64 inventory.remove_item("Pen", 5)
65 assert inventory.get_stock("Pen") == 10
66 # Remove more than available
67 try:
68     inventory.remove_item("Pen", 20)
69 except ValueError as e:
70     assert e.args[0] == "Insufficient stock"
71 # Remove non-existing item
72 try:
73     inventory.remove_item("Banana", 1)
74 except KeyError as e:
75     assert e.args[0] == "Item does not exist"
76 # Negative quantity add
77 try:
78     inventory.add_item("Pencil", -5)
79 except ValueError as e:
80     assert e.args[0] == "Quantity must be positive"
81 # Negative quantity remove
82 try:
83     inventory.remove_item("Pen", -2)
84 except ValueError as e:
85     assert e.args[0] == "Quantity must be positive"
86 print("All Inventory test cases passed successfully ✅")
87
88
89
90 # Suggest improvements for this Inventory class in terms of:

```

**Explanation:** This simulates a mini store system where you can add, remove, and check stock for items.

## Task Description #5 (Date Validation & Formatting – Apply AI for Data Validation)

- Task: Use AI to generate at least 3 assert test cases for validate\_and\_format\_date(date\_str) to check and convert dates.

- Requirements:

- o Validate "MM/DD/YYYY" format.
- o Handle invalid dates.
- o Convert valid dates to "YYYY-MM-DD".

### Example Assert Test Cases:

```
assert validate_and_format_date("10/15/2023") == "2023-10-15"
assert validate_and_format_date("02/30/2023") == "Invalid Date"
assert validate_and_format_date("01/01/2024") == "2024-01-01"
```

Expected Output #5: • Function passes all AI-generated assertions and handles edge cases.

### Output Screenshot:

The screenshot shows a code editor interface with multiple tabs open. The current tab is 'task05.py'. The code in 'task05.py' is as follows:

```
1  # Generate at least 6 assert test cases for:
2  # def validate_and_format_date(date_str):
3  # Requirements:
4  # - Input format must be MM/DD/YYYY
5  # - Validate correct calendar date
6  # - Handle leap year
7  # - Reject invalid format
8  # - Return "Invalid Date" for invalid inputs
9  # - Convert valid date to YYYY-MM-DD
10 # Include boundary cases:
11 # - 02/29/2024 (leap year)
12 # - 02/29/2023 (invalid)
13 # - 13/01/2023 (invalid month)
14 # - 00/10/2023
15 # Return only assert statements.
16 # Write the function:
17 # def validate_and_format_date(date_str):
18 # Requirements:
19 # - Validate format manually (no external libraries)
20 # - Check month range
21 # - Check correct number of days
22 # - Handle leap years properly
23 # - Return formatted date if valid
24 # - Else return "Invalid Date"
25 # Keep the code clean and readable.
26 def validate_and_format_date(date_str):
27     def is_leap_year(year):
28         return (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0)
29
30     try:
31         month, day, year = map(int, date_str.split('/'))
32     except ValueError:
33         return "Invalid Date"
34
35     if month < 1 or month > 12:
36         return "Invalid Date"
37
38     if day < 1:
39         return "Invalid Date"
40
41     if month in [1, 3, 5, 7, 8, 10, 12]:
42         if day > 31:
43             return "Invalid Date"
44
45     if month in [4, 6, 9, 11]:
46         if day > 30:
47             return "Invalid Date"
48
49     if month == 2:
50         if day > 28:
51             return "Invalid Date"
52
53     return f"{year}-{month:02d}-{day:02d}
```

The code editor interface includes a sidebar with file navigation, a central code editor area, and a right-hand panel showing a preview of the code or results. The status bar at the bottom indicates the file is Python 3.9.6.

The screenshot shows a dark-themed instance of Visual Studio Code (VS Code) with the title bar "AI\_Assisted\_Lab". The Explorer sidebar on the left lists files in the "AI\_ASSISTED\_LAB" folder, including "task01.py", "task02.py", "task03.py", "task04.py", "task05.py", "Labtests", and several PDF files. The "task05.py" file is open in the main editor area. The code defines a function `validate\_and\_format\_date` that takes a date string and returns it in YYYY-MM-DD format or an error message if it's invalid. It uses conditional statements to check the month and day, and a leap year calculation for February. A test case at the bottom asserts that all test cases passed successfully. The terminal below shows the command run and the output "All test cases passed successfully".

```
def validate_and_format_date(date_str):  
    if month in [4, 6, 9, 11]:  
        if day > 30:  
            return "Invalid Date"  
    elif month == 2:  
        if is_leap_year(year):  
            if day > 29:  
                return "Invalid Date"  
        else:  
            if day > 28:  
                return "Invalid Date"  
  
    return f"{year:04d}-{month:02d}-{day:02d}"  
  
# Test Cases  
assert validate_and_format_date("02/29/2024") == "2024-02-29"  
assert validate_and_format_date("02/29/2023") == "Invalid Date"  
assert validate_and_format_date("13/01/2023") == "Invalid Date"  
assert validate_and_format_date("00/10/2023") == "Invalid Date"  
assert validate_and_format_date("12/31/2023") == "2023-12-31"  
assert validate_and_format_date("01/01/2023") == "2023-01-01"  
assert validate_and_format_date("02/30/2024") == "Invalid Date"  
assert validate_and_format_date("invalid") == "Invalid Date"  
  
print("All test cases passed successfully ✅")
```

**Explanation:** This ensures a date is valid in “MM/DD/YYYY” format and neatly converts it into “YYYY-MM-DD”.