AI ASSISTANT CODING ASSIGNMENT -8.5

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

Lab Objectives:

• To introduce students to test-driven development (TDD) using AI code generation tools.

• To enable the generation of test cases before writing code implementations.

• To reinforce the importance of testing, validation, and error handling.

• To encourage writing clean and reliable code based on AI- generated test expectations.

Lab Outcomes (LOs):

After completing this lab, students will be able to:

• Use AI tools to write test cases for Python functions and classes.

• Implement functions based on test cases in a test-first development style.

• Analyze the completeness and coverage of AI-generated tests.

• Compare AI-generated and manually written test cases for quality and logic

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

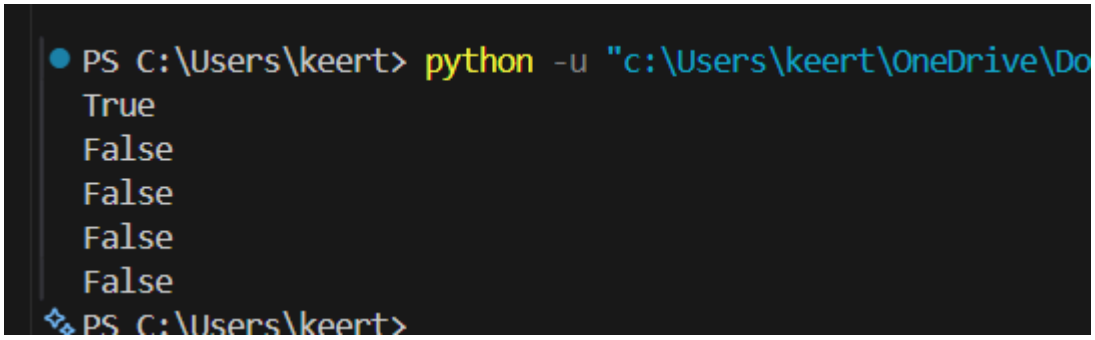
Expected Output #1:

• Username validation logic successfully passing all AI-generated test cases.

Code:

```python
#TestCases
# assert is_valid_username("User123") == True
# assert is_valid_username("12User") == False
# assert is_valid_username("Us er") == False
# assert is_valid_username("User") == False
# assertis_valid_username("User_123")==False
# valid usernames correctly.
def is_valid_username(username):
    if len(username) < 5:
        return False
    if not username[0].isalpha():
        return False
    if not username.isalnum():
        return False
    return True
#example usage
print(is_valid_username("User123"))  # True
print(is_valid_username("12User"))   # False
print(is_valid_username("Us er"))    # False
print(is_valid_username("User"))     # False
print(is_valid_username("User_123")) # False
```

Output:



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.

```python
# assertclassify_value(8)=="Even"
# assert classify_value(7) == "Odd"
# assertclassify_value(0) == "Zero"
# assertclassify_value("abc")=="InvalidInput"
# assert classify_value(2.5) == "Invalid Input"
def classify_value(value):
    if isinstance(value, int):
        if value == 0:
            return "Zero"
        elif value % 2 == 0:
            return "Even"
        else:
            return "Odd"
    else:
        return "Invalid Input"
#Example usage
print(classify_value(8))  # Output: "Even"
print(classify_value(7))  # Output: "Odd"
print(classify_value(0))  # Output: "Zero"
print(classify_value("abc"))  # Output: "Invalid Input"
print(classify_value(2.5))  # Output: "Invalid Input"
```

Output:

```
PS C:\Users\keert> python -u "C:\Users\keert\AppDa
File.python"
Even
Odd
Zero
Invalid Input
Invalid Input
PS C:\Users\keert>
```

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:

```
# assertis_palindrome("Madam")==True
# assertis_palindrome("AmanaplanacanalPanama")==True assert
# is_palindrome("Python") == False
# assert is_palindrome("") == True
# assertis_palindrome("a")==True
def is_palindrome(s):
    cleaned = ''.join(s.split()).lower()#remove spaces and convert to lowercase
    return cleaned == cleaned[::-1]#check if the cleaned string is the same as its reverse
#Example usage
print(is_palindrome("Madam"))  # Output: True
print(is_palindrome("AmanaplanacanalPanama"))  # Output: True
print(is_palindrome("Python"))  # Output: False
print(is_palindrome(""))  # Output: True
print(is_palindrome("a"))  # Output: True
```

Output:

```
PS C:\Users\keert> python -u "C:\Users\keert\
True
True
False
True
True
PS C:\Users\keert>
```

Task Description #4 (BankAccount Class – Apply AI for Object-Oriented Test-Driven Development)

• Task: Ask AI to generate at least 3 assert-based test cases for a BankAccount class and then implement the class.

• Methods:

o deposit(amount)

o withdraw(amount)

o get_balance()

Example Assert Test Cases:

acc = BankAccount(1000)

acc.deposit(500)

assert acc.get_balance() == 1500

acc.withdraw(300)

assert acc.get_balance() == 1200

Expected Output #4:

• Fully functional class that passes all AI-generated assertions.

Code:

```python
# acc=BankAccount(1000)
# acc.deposit(500)
# assertacc.get_balance()== 1500
# acc.withdraw(300)
# assertacc.get_balance()== 1200
# acc.withdraw(2000)
# assertacc.get_balance()==1200
# acc.withdraw(1500) #Should print "Insufficient funds"
class BankAccount:
    def __init__(self, initial_balance=0):
        self.balance = initial_balance
    def deposit(self, amount):
        if amount > 0:
            self.balance += amount
    def withdraw(self, amount):
        if amount > self.balance:
            print("Insufficient funds")
        elif amount > 0:
            self.balance -= amount
    def get_balance(self):
        return self.balance
#Example usage
acc = BankAccount(1000)
acc.deposit(500)
print(acc.get_balance())  # Output: 1500
acc.withdraw(300)
print(acc.get_balance())  # Output: 1200
acc.withdraw(2000)
```

Output:

```
PS C:\Users\keert> python -u "C:\Users\keert\AppData\Lo
File.python"
1500
1200
Insufficient funds
PS C:\Users\keert>
```

Task Description #5 (Email ID Validation – Apply AI for Data Validation)

• 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 cases and handling edge cases correctly.

Code:

```
# assertvalidate_email("user@example.com")==True
# assert validate_email("userexample.com") == False
# assert validate_email("@gmail.com") == False
# assert validate_email("user@.com") == False
def validate_email(email):
    if email.count('@') != 1:
        return False
    local_part, domain_part = email.split('@')
    if not local_part or not domain_part:
        return False
    if '.' not in domain_part:
        return False
    return True
#Example usage
print(validate_email("user@example.com"))
print(validate_email("userexample.com"))
print(validate_email("@gmail.com"))
print(validate_email("user@.com"))
```

Output:

```
PS C:\Users\keert> python -u "C:\Users\keert\AppData\Loca
File.python"
True
False
False
True
PS C:\Users\keert>
```