

## ASSIGNMENT- 8.3

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Task 1: Email Validation using TDD

Scenario

You are developing a user registration system that requires reliable email input validation.

Requirements

- Must contain @ and . characters
- Must not start or end with special characters
- Should not allow multiple @ symbols
- AI should generate test cases covering valid and invalid email formats
- Implement `is_valid_email(email)` to pass all AI-generated test cases

Expected Output

- Python function for email validation
- All AI-generated test cases pass successfully
- Invalid email formats are correctly rejected
- Valid email formats return True

CODE:

```
1 #generate a user registration system that requires reliable email input validation.
2 #Must contain @ and . characters
3 # Must not start or end with special characters
4 # Should not allow multiple @ symbols
5 # AI should generate test cases covering valid and invalid email formats
6 # Implement is_valid_email(email) to pass all AI-generated test cases
7 import re
8 def is_valid_email(email):
9     # Check for exactly one @ symbol
10    if email.count('@') != 1:
11        return False
12    # Check for presence of . character
13    if '.' not in email:
14        return False
15    # Check for valid characters and structure using regex
16    pattern = r'^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,}$'
17    return re.match(pattern, email) is not None
18 # Test cases
19 test_emails = [
20     "user@example.com",          # Valid
21     "invalid.email",            # Invalid - no @
22     "user@.com",                # Invalid - no domain name
23     "@example.com",            # Invalid - no local part
24     "user@example",            # Invalid - no TLD
25     "user@example..com",        # Invalid - multiple dots
26     "user@@example.com",        # Invalid - multiple @ symbols
27     ".user@example.com",        # Invalid - starts with special character
28     "user@example.com.",        # Invalid - ends with special character
29
30     "user@exam ple.com",        # Invalid - space in domain name
31     "user@exam_ple.com",        # Valid - underscore in domain name
32     "user@example.co.uk",       # Valid - multi-level domain
33     "user+tag@example.com",     # Valid - plus in local part
34     "user_name@example-domain.com" # Valid - underscore and hyphen in local part and domain name
35 ]
36 for email in test_emails:
37     print(f"{email}: {is_valid_email(email)}")
38 #Expected Output: True for valid emails, False for invalid ones.
39
```

OUTPUT:

```
assignment 8.3.py"
user@example.com: True
invalid.email: False
user@.com: False
@example.com: False
user@example: False
user@example..com: True
user@@example.com: False
.user@example.com: True
user@example.com.: False
user@exam ple.com: False
user@exam ple.com: False
user@example.co.uk: True
user+tag@example.com: True
user_name@example-domain.com: True
```

## Task 2: Grade Assignment using Loops

### Scenario

You are building an automated grading system for an online examination platform.

### Requirements

- AI should generate test cases for `assign_grade(score)` where:
  - 90–100 → A
  - 80–89 → B
  - 70–79 → C
  - 60–69 → D
  - Below 60 → F

- Include boundary values (60, 70, 80, 90)
- Include invalid inputs such as -5, 105, "eighty"
- Implement the function using a test-driven approach

### Expected Output

- Grade assignment function implemented in Python
- Boundary values handled correctly
- Invalid inputs handled gracefully
- All AI-generated test cases pass

CODE:

```

39
40 #generate automated grading system for an online examination platform.
41 # AI should generate test cases for assign_grade(score) where:
42 # 90-100 → A
43 # 80-89 → B
44 # 70-79 → C
45 # 60-69 → D
46 # Below 60 → F
47 # Include boundary values (60, 70, 80, 90)
48 # Include invalid inputs such as -5, 105, "eighty"
49 # Implement the function using a test-driven approach
50 def assign_grade(score):
51     if isinstance(score, str) or score < 0 or score > 100:
52         return "Invalid input"
53     if score >= 90:
54         return 'A'
55     elif score >= 80:
56         return 'B'
57     elif score >= 70:
58         return 'C'
59     elif score >= 60:
60         return 'D'
61     else:
62         return 'F'
63 # Test cases
64 test_scores = [95, 85, 75, 65, 55, 60, 70, 80, 90, -5, 105, "eighty"]
65 for score in test_scores:
66     print(f"{score}: {assign_grade(score)}")
67 #Expected Output: Correct grade for valid scores, "Invalid input" for invalid ones.
68

```

OUTPUT:

```

95: A
85: B
75: C
65: D
55: F
60: D
70: C
80: B
90: A
-5: Invalid input
105: Invalid input
eighty: Invalid input

```

### Task 3: Sentence Palindrome Checker

#### Scenario

You are developing a text-processing utility to analyze sentences.

#### Requirements

- AI should generate test cases for `is_sentence_palindrome(sentence)`
- Ignore case, spaces, and punctuation
- Test both palindromic and non-palindromic sentences
- Example:  
– "A man a plan a canal Panama" → True

#### Expected Output

- Function correctly identifies sentence palindromes
- Case and punctuation are ignored
- Returns True or False accurately
- All AI-generated test cases pass

CODE:

```

#Generate a text-processing utility to analyze sentences.
# AI should generate test cases for is_sentence_palindrome(sentence)
# Ignore case, spaces, and punctuation
# Test both palindromic and non-palindromic sentences
# Example:
# "A man a plan a canal Panama" → True

import re
def is_sentence_palindrome(sentence):
    # Remove non-alphanumeric characters and convert to lowercase
    cleaned = re.sub(r'^A-Za-z0-9', '', sentence).lower()
    return cleaned == cleaned[::-1]
# Test cases
test_sentences = [
    "A man a plan a canal Panama", # Palindrome
    "Hello World", # Not a palindrome
    "Was it a car or a cat I saw?", # Palindrome
    "No 'x' in Nixon", # Palindrome
    "This is not a palindrome", # Not a palindrome
    "Madam In Eden, I'm Adam", # Palindrome
    "12321", # Palindrome
    "12345" # Not a palindrome
]
for sentence in test_sentences:
    print(f'{sentence}: {is_sentence_palindrome(sentence)}')
#Expected Output: True for palindromic sentences, False for non-palindromic ones.

```

OUTPUT:

```

'A man a plan a canal Panama': True
'Hello World': False
'Was it a car or a cat I saw?': True
'No 'x' in Nixon': True
'This is not a palindrome': False
'Madam In Eden, I'm Adam': True
'12321': True
'12345': False

```

## Task 4: ShoppingCart Class

### Scenario

You are designing a basic shopping cart module for an e-commerce application.

### Requirements

- AI should generate test cases for the ShoppingCart class
- Class must include the following methods:
  - add\_item(name, price)
  - remove\_item(name)
  - total\_cost()
- Validate correct addition, removal, and cost calculation
- Handle empty cart scenarios

### Expected Output

- Fully implemented ShoppingCart class
- All methods pass AI-generated test cases
- Total cost is calculated accurately
- Items are added and removed correctly

CODE:

```

#Generate a basic shopping cart module for an e-commerce application.
# AI should generate test cases for the ShoppingCart class
# Class must include the following methods:
# add_item(name, price)
# remove_item(name)
# total_cost()
# Validate correct addition, removal, and cost calculation
# Handle empty cart scenarios

class ShoppingCart:
    def __init__(self):
        self.items = {}
    def add_item(self, name, price):
        self.items[name] = price
    def remove_item(self, name):
        if name in self.items:
            del self.items[name]
    def total_cost(self):
        return sum(self.items.values())

# Test cases
cart = ShoppingCart()
cart.add_item("Book", 12.99)
cart.add_item("Pen", 1.50)
print(f"Total cost after adding items: {cart.total_cost()}") # Expected: 14.49
cart.remove_item("Pen")
print(f"Total cost after removing Pen: {cart.total_cost()}") # Expected: 12.99
cart.remove_item("Notebook") # Removing non-existing item
print(f"Total cost after trying to remove non-existing item: {cart.total_cost()}") # Expected: 12.99
cart.remove_item("Book")
print(f"Total cost after removing Book: {cart.total_cost()}") # Expected: 0.0

```

OUTPUT:

```

Total cost after adding items: 14.49
Total cost after removing Pen: 12.99
Total cost after trying to remove non-existing item: 12.99
Total cost after removing Book: 0

```

## Task 5: Date Format Conversion

### Scenario

You are creating a utility function to convert date formats for reports.

### Requirements

- AI should generate test cases for `convert_date_format(date_str)`
- Input format must be "YYYY-MM-DD"
- Output format must be "DD-MM-YYYY"
- Example:  
– "2023-10-15" → "15-10-2023"

### Expected Output

- Date conversion function implemented in Python
- Correct format conversion for all valid inputs
- All AI-generated test cases pass successfully

CODE:

```

#Generate utility function to convert date formats for reports.
# AI should generate test cases for convert_date_format(date_str)
# Input format must be "YYYY-MM-DD"
# Output format must be "DD-MM-YYYY"
# Example:
# "2023-10-15" → "15-10-2023"
from datetime import datetime

def convert_date_format(date_str):
    try:
        date_obj = datetime.strptime(date_str, "%Y-%m-%d")
        return date_obj.strftime("%d-%m-%Y")
    except ValueError:
        return "Invalid date format"

# Test cases
test_dates = [
    "2023-10-15", # Valid date
    "1990-01-01", # Valid date
    "2023/10/15", # Invalid format
    "15-10-2023", # Invalid format
    "2023-13-01", # Invalid month
    "2023-00-10", # Invalid month
    "2023-10-32", # Invalid day
    "2023-10-00" # Invalid day
]
for date in test_dates:
    print(f"{date}: {convert_date_format(date)}")
#Expected Output: Correctly converted date for valid inputs, "Invalid date format" for invalid ones.

```

OUTPUT:

```

2023-10-15: 15-10-2023
1990-01-01: 01-01-1990
2023/10/15: Invalid date format
15-10-2023: Invalid date format
2023-13-01: Invalid date format
2023-00-10: Invalid date format
2023-10-32: Invalid date format
2023-10-00: Invalid date format

```