Milestone 2
Task 2:
WhiteBox Testing

1. Test Cases for Statement Coverage

These test cases will cover different paths through the code.

Test Case 1: Successful Deposit

- **Description**: Test depositing a valid amount.
- **Inputs**:
  - Account Number: "627856"
  - Amount: 500
- **Expected Outcome**:
  - New Balance: 1500
  - Console Output: "Deposited $500. New balance: $1,500.00"

Test Case 2: Successful Withdrawal

- **Description**: Test withdrawing a valid amount.
- **Inputs**:
  - Account Number: "627846"
  - Amount: 200
- **Expected Outcome**:
  - New Balance: 300 (due to the bug, should show 100)
  - Console Output: "Withdrawn $200. New Balance: $100.00"

Test Case 3: Invalid Withdrawal

- **Description**: Test withdrawing an amount greater than the balance.
- **Inputs**:
  - Account Number: "627846"
  - Amount: 600
- **Expected Outcome**:
  - Console Output: "Insufficient funds!"
- **Calculating:**
  1. First, calculate the fraction:
     25 / 37 ≈ 0.6757
  2. Then, multiply by 100 to convert to a percentage:
     0.6757 × 100 ≈ 67.57%
- **Final Statement Coverage:**
  Statement Coverage ≈ 68%

2. Test Cases for Branch Coverage:

Test Case 1: Successful Product Removal

- **Description**: Test removing an existing product.

- **Inputs**:
  - Product ID: "102"

- **Expected Outcome**:
  - Console Output: "Product Mouse removed."

Test Case 2: Attempt to Remove a Non-Existing Product

- **Description**: Test removing a product that does not exist.

- **Inputs**:
  - Product ID: "999"

- **Expected Outcome**:
  - Console Output: "Product not found."

Test Case 3: Successful Stock Level Monitoring

- **Description**: Test monitoring stock levels when some products are low in stock.

- **Inputs**:
  - Products:
    - "201" (Stock Level: 4)
    - "202" (Stock Level: 10)

- **Expected Outcome**:
  - Console Output: "Low stock alert for Keyboard!"

- **Branch Coverage Calculation**

  Formula:

  Branch Coverage = (Covered Branches / Total Branches) × 100

  Identifying Branches:

- In the UpdateProduct method:
  - Branch 1: Product exists (true)
  - Branch 2: Product does not exist (false)

- In the RemoveProduct method:
  - Branch 1: Product exists (true)
  - Branch 2: Product does not exist (false)

- In the MonitorStockLevels method:
  - Branch 1: Stock level is low (true)
  - Branch 2: Stock level is not low (false)

Total Branches: 6 (2 from UpdateProduct + 2 from RemoveProduct + 2 from MonitorStockLevels)

Covered Branches: 4 (Branches 1 for UpdateProduct, both branches for RemoveProduct, and Branch 1 for MonitorStockLevels)

- **Plugging in the numbers:** Branch Coverage = (4 / 6) × 100

- **Calculating:**
    1. First, calculate the fraction: 4 / 6 = 0.6667

    2. Then, multiply by 100 to convert to a percentage: 0.6667 × 100 ≈ 66.67%

- **Final Branch Coverage:**
  Branch Coverage ≈ 67%

3. Test Cases for Conditional Coverage

These test cases will focus on testing each condition in the methods.

Test Case 1: Successful Product Addition

- **Description**: Test adding a valid product.

- **Inputs**:
    - Product ID: "201"
    - Name: "Monitor"
    - Stock Level: 15
    - Price: 200.00

- **Expected Outcome**:
    - Console Output: "Product Monitor added."

Test Case 2: Update Product with Valid ID

- **Description**: Test updating a product with a valid ID.

- **Inputs**:
    - Product ID: "102" (Existing)
    - New Stock Level: 10
    - New Price: 20.00

- **Expected Outcome**:
    - Console Output: "Product Mouse updated."

Test Case 3: Attempt to Update a Non-Existing Product

- **Description**: Test updating a product that does not exist.

- **Inputs**:
    - Product ID: "999" (Non-existing)
    - New Stock Level: 5
    - New Price: 50.00

- **Expected Outcome**:
    - Console Output: "Product not found."

Conditional Coverage Calculation
Formula:
Conditional Coverage = (Covered Conditions / Total Conditions) × 100

Identifying Conditions:

- In the UpdateProduct method:
    - Condition 1: Product exists (true)
    - Condition 2: Product does not exist (false)

- In the RemoveProduct method:
    - Condition 1: Product exists (true)
    - Condition 2: Product does not exist (false)

- In the MonitorStockLevels method:
    - Condition 1: Stock level is low (true)
    - Condition 2: Stock level is not low (false)

Total Conditions: 6 (2 from UpdateProduct + 2 from RemoveProduct + 2 from MonitorStockLevels)

Covered Conditions: 5 (Both conditions for UpdateProduct, both conditions for RemoveProduct, and one condition for MonitorStockLevels)

Plugging in the numbers:
Conditional Coverage = (5 / 6) × 100

Calculating:

1. First, calculate the fraction: 5 / 6 = 0.8333

2. Then, multiply by 100 to convert to a percentage: 0.8333 × 100 ≈ 83.33%

Final Conditional Coverage:
Conditional Coverage ≈ 83%