Test Cases for Simple Calculator Application

Here are detailed test cases for a simple calculator application that performs add, subtract, multiply, and divide operations, covering both valid and invalid inputs:

Basic Arithmetic Operations

Test Case 1: Addition of two positive numbers

- Test Case ID: TC_ADD_01
- Test Description: Verify addition of two positive numbers
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "5"
    2. Press "+" button
    3. Enter "3"
    4. Press "=" button
- Expected Results: Display shows "8"

Test Case 2: Subtraction of positive numbers

- Test Case ID: TC_SUB_01
- Test Description: Verify subtraction of positive numbers
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "10"
    2. Press "-" button
    3. Enter "4"
    4. Press "=" button
- Expected Results: Display shows "6"

Test Case 3: Multiplication of two numbers

- Test Case ID: TC_MUL_01
- Test Description: Verify multiplication of two numbers
- Preconditions: Calculator is open and ready to accept input

- Test Steps:
    1. Enter "7"
    2. Press "*" button
    3. Enter "3"
    4. Press "=" button
- Expected Results: Display shows "21"

Test Case 4: Division of two numbers

- Test Case ID: TC_DIV_01
- Test Description: Verify division of two numbers
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "15"
    2. Press "/" button
    3. Enter "5"
    4. Press "=" button
- Expected Results: Display shows "3"

Edge Cases and Special Scenarios

Test Case 5: Division by zero

- Test Case ID: TC_DIV_02
- Test Description: Verify handling of division by zero
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "10"
    2. Press "/" button
    3. Enter "0"
    4. Press "=" button
- Expected Results: Display shows "Error" or "Cannot divide by zero"

Test Case 6: Addition with negative numbers

- Test Case ID: TC_ADD_02
- Test Description: Verify addition with negative numbers
- Preconditions: Calculator is open and ready to accept input

- Test Steps:
    1. Enter "-5"
    2. Press "+" button
    3. Enter "8"
    4. Press "=" button
- Expected Results: Display shows "3"

Test Case 7: Decimal number operations

- Test Case ID: TC_DEC_01
- Test Description: Verify operations with decimal numbers
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "3.5"
    2. Press "*" button
    3. Enter "2"
    4. Press "=" button
- Expected Results: Display shows "7.0"

Invalid Input Handling

Test Case 8: Non-numeric input

- Test Case ID: TC_INV_01
- Test Description: Verify handling of non-numeric input
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "abc"
    2. Press any operation button
- Expected Results: Calculator does not accept input or displays "Invalid input"

Test Case 9: Multiple decimal points

- Test Case ID: TC_INV_02
- Test Description: Verify handling of multiple decimal points
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "5.5.5"

    2. Press any operation button
- Expected Results: Calculator does not accept the second decimal point or displays "Invalid number"

BODMAS/PEMDAS Rule Verification

Test Case 10: Operation precedence

- Test Case ID: TC_BODMAS_01
- Test Description: Verify operation precedence (BODMAS/PEMDAS rules)
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "2"
    2. Press "+" button
    3. Enter "3"
    4. Press "*" button
    5. Enter "4"
    6. Press "=" button
- Expected Results: Display shows "14" (not 20, as multiplication has higher precedence)

Test Case 11: Parentheses handling

- Test Case ID: TC_BODMAS_02
- Test Description: Verify parentheses override operation precedence
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "("
    2. Enter "2"
    3. Press "+" button
    4. Enter "3"
    5. Enter ")"
    6. Press "*" button
    7. Enter "4"
    8. Press "=" button
- Expected Results: Display shows "20" (parentheses evaluated first)

Additional Test Cases

Test Case 12: Clear function

- Test Case ID: TC_UTIL_01
- Test Description: Verify clear function resets the calculator
- Preconditions: Calculator is open with some numbers entered
- Test Steps:
    1. Enter "123"
    2. Press "C" (clear) button
    3. Enter "5"
    4. Press "+" button
    5. Enter "3"
    6. Press "=" button
- Expected Results: Display shows "8" (previous input was cleared)

Test Case 13: Sequential operations

- Test Case ID: TC_SEQ_01
- Test Description: Verify sequential operations without pressing equals
- Preconditions: Calculator is open and ready to accept input
- Test Steps:
    1. Enter "10"
    2. Press "+" button
    3. Enter "5"
    4. Press "-" button
    5. Enter "3"
    6. Press "=" button
- Expected Results: Display shows "12" (10+5-3)