Arithmetic Expression Evaluator

Test Case

Version <1.0>

Revision History

| **Date** | **Version** | **Description** | **Author** |
| --- | --- | --- | --- |
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**Test Case**

# Purpose

This Test Case Specification document for the Arithmetic Expression Evaluator defines test cases to verify the functionality and intentional behavior of the evaluation functionality based on certain inputs.

The test cases use a black box testing approach to ensure the user experience is accurately recreated.

# Test case identifier

The test case IDs are specified for each test case in the table below.

| Test Case ID | Test case description | Test data | Expected results | Actual results | Pass/fail status |
| --- | --- | --- | --- | --- | --- |
| TC01 | Addition operator | 2+3 | 5 | 5 | PASS |
| TC02 | Subtraction operator | 2-3 | -1 | -1 | PASS |
| TC03 | Multiplication operator | 2\*3 | 6 | 6 | PASS |
| TC04 | Division operator | 4/2 | 2 | 2 | PASS |
| TC05 | Exponential operator | 2^3 | 8 | 8 | PASS |
| TC06 | Division operator with fractional result | 2/3 | 0 | 0 | PASS |
| TC07 | Unary operator | -2+3 | 1 | 1 | PASS |
| TC08 | Unary operator | 2+(-3) | -1 | -1 | PASS |
| TC09 | Multiple operations | 2+3+4+5 | 14 | 14 | PASS |
| TC10 | Multiple operations | 2\*3\*4\*5 | 120 | 120 | PASS |
| TC11 | Multiple operations | 2^2^2 | 16 | 16 | PASS |
| TC12 | PEMDAS | 10 - 3 + 2 | 9 | 9 | PASS |
| TC13 | PEMDAS | 1+2-3\*4 | -9 | -9 | PASS |
| TC14 | PEMDAS | 2\*3^2 | 18 | 18 | PASS |
| TC15 | PEMDAS | 10-8/2 | 6 | 6 | PASS |
| TC16 | PEMDAS | 5+(6/2)\*3-2^2 | 10 | 10 | PASS |
| TC17 | Parentheses | (2+3) | 5 | 5 | PASS |
| TC18 | Parentheses | ((2\*(4/2))+2) | 6 | 6 | PASS |
| TC19 | Parentheses | (2+(3\*4))\*(5+6) | 154 | 154 | PASS |
| TC20 | Clean up spaces test | 2 + 3 | 5 | 5 | PASS |
| TC21 | Clean up spaces test | 2+3 + 2 | 7 | 7 | PASS |
| TC22 | Clean up parentheses | [2+{2+(2+2)}] | 8 | 8 | PASS |
| TC23 | Division by zero | 1/0 | Error: Division by zero | Error: Division by zero | PASS |
| TC24 | Missing operand | + | Error: Operator in invalid position | Error: Operator in invalid position | PASS |
| TC25 | Missing right operand | 1+ | Error: Expression ends with an operator | Error: Expression ends with an operator | PASS |
| TC26 | Check unsupported implied multiplication | (1+1)(1+1) | Error: Invalid expression | Error: Invalid expression | PASS |
| TC27 | Empty expression |  | Error: Empty input string | Error: Empty input string | PASS |
| TC28 | Invalid characters | a | Error: Invalid character in input | Error: Invalid character in input | PASS |
| TC29 | Unclosed parentheses test | (1+3)) | Error: Invalid expression | Error: Invalid expression | PASS |
| TC30 | Empty parentheses test | () | Error: Invalid parentheses | Error: Invalid parentheses | PASS |

# Test item

Refer to the test case table in section 2.

# Input specifications

Refer to the Test data column in the test case table in section 2.

The inputs are to be passed into the program though the user prompt to input an expression.

# Output specifications

Refer to the Expected Results column in the test case table in section 2.

# Environmental needs

### Hardware

N/A

### Software

To compile from source:  
 g++ (>=11.4)

make (>=4.3)

The software was designed specifically with Ubuntu in mind, however most Linux distros should work.

To run the automated test suite, run make test.

### Other

The test cases must be performed on a properly compiled version of the program. The test cases do not cover cases where the program may be malfunctioning due to external factors.

# Special procedural requirements

N/A

# Intercase dependencies

N/A