**C++ 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 <Project Name> defines a test case for an item that should be tested.*

*[The sections of the test case specification shall be ordered in the specified sequence. Additional sections may be included at the end. If some or all of the content of a section is in another document, then a reference to that material may be listed in place of the corresponding content. The referenced material must be attached to the test case specification or available to users of the case specification.].*

| Test Case ID | Test Case Description | Math Operations | Expected Results | Actual Results | Pass/Fail |
| --- | --- | --- | --- | --- | --- |
| Add - 01 | Test basic addition | 2 + 3 | 5 | 5 | Pass |
| Add - 02 | Test addition with zeros | 0 + 0 | 0 | 0 | Pass |
| Sub - 03 | Test basic subtraction | 5 - 3 | 2 | 2 | Pass |
| Sub - 04 | Test subtraction with zero result | 0 - 5 | -5 | -5 | Pass |
| Mult - 05 | Test basic multiplication | 4 \* 2 | 8 | 8 | Pass |
| Mult - 06 | Test multiplication with zero | 0 \* 10 | 0 | 0 | Pass |
| Div - 07 | Test basic division | 8 / 4 | 2 | 2 | Pass |
| Div - 08 | Test division with non-zero result | 10 / 2 | 5 | 5 | Pass |
| Add - 09 | Test addition and subtraction | 6 + 7 - 3 | 10 | 10 | Pass |
| Mult - 10 | Test multiplication and division | 4 \* 3 / 2 | 6 | 6 | Pass |
| Mix - 11 | Test mixed operations | 2 + 5 \* 3 - 1 | 16 | 16 | Pass |
| DivByZero - 12 | Test division by zero handling | 10 / 0 (Ensure your calculator handles this case gracefully) | Undefined (graceful handling) | Error: Attempted division/modulo by zero | Pass |
| Neg - 13 | Test negative numbers | -3 + 7 | 4 | 4 | Pass |
| Deci - 14 | Test decimal numbers | 2.5 + 1.5 | 4 | 4 | Pass |
| Add - 15 | Test large numbers addition | 1000000 + 500000 | 1500000 | 1500000 | Pass |
| Mult - 16 | Test large result multiplication | 999999 \* 2 | 1999998 | 1999998 | Pass |
| Comb - 17 | Test combination with parentheses | 2 \* (3 + 4) | 14 | 14 | Pass |
| Comb - 18 | Test combination with complex parentheses | (5 + 2) / (3 - 1) | 3.5 | 3.5 | Pass |
| Exp - 19 | Test exponentiation | 2^3 (2 raised to the power of 3) | 8 | 8 | Pass |
| Exp - 20 | Test exponentiation with decimal | 2.5^2 (Exponentiation with Decimal) | 6.25 | 6.25 | Pass |
| CombParen-21 | Nested Parentheses | (2 + 3) \* 4 | 20 | 20 | Pass |
| CombParen-22 | Complex Parentheses | 2 \* (3 + (4 - 2)) | 10 | 10 | Pass |
| CombParen-33 | Multiple Parentheses | (5 + 2) / (3 - (1 + 2)) | undefined | Error: Attempted division/modulo by zero | Pass |
| NestedMult-24 | Nested Multiplication | 2 \* (3 \* 4) | 24 | 24 | Pass |
| NestedDiv-25 | Nested Division | 10 / (2 / 5) | 25 | 25 | Pass |
| MixParen-26 | Mixed Operations with Parentheses | (6 + 7) \* (3 - 1) / 2 | 13 | 13 | Pass |
| NestedExp-27 | Nested Exponentiation | (2^3) + 1 | 9 | 9 | Pass |
| ExpParen-28 | Exponentiation with Parentheses | (1.5^2) \* 2 | 4.5 | 4.5 | Pass |
| ParenNeg-29 | Parentheses with Negative Numbers | - (3 + 5) | -8 | -8 | Pass |
| DivByZeroNested-30 | Nested Division by Zero | 15 / (2 / (5 - 5)) | Undefined | Error: Attempted division/modulo by zero | Pass |
| CombParenNested-31 | Combination with Multiple Parentheses | (4 + 2) / (3 - (2 + 1)) | Undefined | Error: Attempted division/modulo by zero | Pass |
| NestedLarge-32 | Nested Operations with Large Numbers | (1000000 + 500000) \* (999999 \* 2) | 3.00E+12 | 3.00E+12 | Pass |
| CombParenDec-33 | Combination with Decimal and Parentheses | 2.5 \* (1.5 + 0.5) | 5 | 5 | Pass |
| NestedNeg-34 | Nested Negative Numbers | -(-3 + 7) | -4 | -4 | Pass |
| MixParenNested-35 | Mixed Operations with Parentheses | 2 + (5 \* (3 - 1)) | 12 | 12 | Pass |
| CombNestedParen-36 | Combination with Nested Parentheses | ((5 + 2) / 3) - 1 | 1.333333333 | 1.333333333 | Pass |
| NestedMultDiv-37 | Nested Multiplication and Division | (4 \* (3 + 2)) / 2 | 10 | 10 | Pass |
| ParenExp-38 | Parentheses within Exponentiation | (2^ (3 + 1)) | 16 | 16 | Pass |
| CombDecExp-39 | Combination with Decimal and Exponentiation | 1.5^ (2 \* 2) | 5.0625 | 5.0625 | Pass |
| NestedParenDec-40 | Nested Parentheses with Decimal | (3.5 + 1.5) / (2 - 1) | 5 | 5 | Pass |
| NegParenDec-41 | Nested Parentheses with Negative Decimal | - (2.5 \* (1.5 - 0.5)) | -2.5 | -2.5 | Pass |
| ComplexExpParen-42 | Complex Parentheses with Exponentiation | ((2^2) + 1)^2 | 25 | 25 | Pass |
| NestedMixParen-43 | Nested Parentheses with Mixed Operations | (3 + (4 \* 2)) - 5 | 6 | 6 | Pass |
| CombParenNeg-44 | Combination with Parentheses and Negative Numbers | (-3 + 7) / (2 - 1) | 4 | 4 | Pass |
| NestedCombParen-45 | Nested Combination with Parentheses | (4 \* (3 - (2 + 1))) / 2 | 0 | 0 | Pass |
| ParenDiv-46 | Parentheses within Division | (15 + 5) / (2 + 1) | 6.666666667 | 6.666666667 | Pass |
| CombParenLarge-47 | Combination with Parentheses and Large Numbers | (9876543 + 1234567) / (1111111 \* 8) | 1.25 | 1.25 | Pass |
| NestedExpNeg-48 | Nested Parentheses with Exponentiation and Negative Numbers | (- (2^2) + 1) / -3 | 1 | 1 | Pass |
| NestedMixParen-49 | Nested Parentheses with Multiple Operations | (2 + 3 \* (4 - 1)) / 2 | 5.5 | 5.5 | Pass |
| CombDecParenExp-50 | Combination with Decimal, Parentheses, and Exponentiation | (1.5^2) \* (2 + 0.5) | 5.625 | 5.625 | Pass |

# Environmental needs

### Hardware (nothing particular for the arithmetic expression project)

*Specify the characteristics and configurations of the hardware required to execute this test*   
Not applicable

### Software (nothing particular for the arithmetic expression project)

*Specify the system and application software required to execute this test case. This may include system software such as operating systems, compilers, simulators, and test tools. In addition, the test item may interact with application software.*

Not applicable

### Other

*Specify any other requirement.*

# Special procedural requirements

*Describe any special constraints on the test procedures that execute this test case. These constraints may involve special set up, operator intervention, output determination procedures, and special wrap up.*

Not applicable

# Intercase dependencies

*List the identifiers of test cases that must be executed prior to this test case. Summarize the nature of the dependencies.*

Not applicable