Math Olympiads

Arithmetic Expression Evaluator

Test Case

Version <1.0>

Revision History

Date	Version	Description	Author
<11/12/24>	<0.5>	<Write test cases>	<Entire Team>
<12/12/24>	<1.0>	<Add test results>	<Entire Team>

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Test Case

1. 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.

2. 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

3. Test item

Refer to the test case table in section 2.

4. 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.

5. Output specifications

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

6. Environmental needs

6.1.1 Hardware

N/A

6.1.2 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.

6.1.3 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.

7. Special procedural requirements

N/A

8. Intercase dependencies

N/A