TEST SUITE FOR LED

This document contains test cases for LED (Language of Effective Definitions). The specification of LED is [here](https://docs.google.com/document/d/1xj5VUX6l9NYXQFuT-gVksSMwx5ovuQFkGymcgoZBagc/edit?usp=sharing).

OPERATIONS

Arithmetic

addition

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 0.(3..) + 0.(6..) (won't work in JS) | 1 |
| 1 + 2/0 | undefined |

subtraction

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 2.4(9..) - 2.5 (won't work in JS) | 0 |
| 4 - 0^0 | undefined |

unary plus

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| +3.(9..) (won't work in JS) | 4 |
| +0 | 0 |
| +3 / 0 | undefined |

unary minus

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| -2.(9..) (won't work in JS) | -3 |
| -0.(0..) (won't work in JS) | 0 |
| -1+4 | 3 |
| 2 / -0 | undefined |

product

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| .(3..) \* 3 | 1 |
| 1+2 \* -3 | -5 |
| (1 + 2)\*-3 | -9 |
| 1 / 0 \* 0 | undefined |

quotient

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 2 / 3 | 0.(6..) |
| 2.(6..)/-1.(3..) | -2 |
| 2 / 2/2 | 0.5 |
| 6 / 2\*3 | 9 |
| 5 / 0 | undefined |

floor

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| floor(5.2) | 5 |
| floor(-2.4) | -3 |
| floor(0.(9..)) | 1 |
| floor(0/0) | undefined |

ceiling

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| ceil(20.4) | 21 |
| ceil(-0.9) | 0 |
| ceil(-0.(9..)) | -1 |
| ceil(0^0) | undefined |

absolute value

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| |-2.4| | 2.4 |
| +|-ceil(floor(1/-3))| | 1 |
| |3 mod 0| | undefined |

modulus

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 5 mod 3 | 2 |
| 5 mod 1 | 0 |
| 5 mod 0 | undefined |
| 5 mod -1 | undefined |
| 5 mod 1.5 | undefined |

exponentiation

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 2.5 ^ 2 | 6.25 |
| -3 ^ -1 | -0.(3..) |
| 0^0 | undefined |
| 4^0.5 | undefined |

less than

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 2.1 < 3 | true |
| -0 < +0 | false |
| 2 mod -1 < 1 | undefined |

greater than

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 1.4 > 1.39999 | true |
| 1.4 > 1.3(9..) | false |
| 5 mod 1.5 > 0 | undefined |

less than or equal to

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 1 <= 1.01 | true |
| 1 <= 1.0 | true |
| 1 <= 0.99 | false |
| 5.4 mod 2 <= 0 | undefined |

greater than or equal to

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 3.1 >= 3 | true |
| 1.(9..) >= 2 | true |
| 6.4 >= 9.3 | false |
| 0^0 >= -3.1 | undefined |

integer interval

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {3..6} | {3, 4, 5, 6} |
| {0..-1} | {} |
| {3 .. 6.7} | undefined |

Boolean

conjunction

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| true & true | true |
| true & false | false |
| false & true | false |
| false & false | false |
| false & 1/0 = 5 | false |
| true & 1/0 > 2 | undefined |

disjunction

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| true V true | true |
| true V false | true |
| false V 1+1=2 | true |
| false V 1+1=1 | false |
| true V 0^0 = 1 | undefined |

negation

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| ~true | false |
| ~1>2 | true |
| ~(~false) | false |
| ~(false & 4 > 0^0) | true |
| ~(true V 4 > 0^0) | undefined |

implication

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| true => true | true |
| true => false | false |
| false => true | true |
| false => 1=2 | true |
| false=>false => false | true |
| false => 0^0 = -1 | true |
| 0^0 = -1 => true | undefined |

equivalence

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| true <=> true | true |
| true <=> false | false |
| false <=> true | false |
| false <=> false | true |
| false<=>true => true | false |
| 0^0 = 1 <=> 0^0 = 1 | undefined |

Tuple

indexing

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| ((1, (2.1, 2.2), 3)[2])[1] | 2.1 |
| (1, 2)[0] | undefined |
| (1, 2)[3] | undefined |

tuple equality

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| (1, 2) = (1, 2) | true |
| (1, 2) = (1, 2, 3) | false |
| (1, 2) = (1, 3) | false |
| (1, 2) = {1, 2} | false |
| (1, 2) = (0^0, 2) | undefined |

Set

set membership

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| 2 in {1, 2, 3} | true |
| 0 in {} | false |
| {} in {{}} | true |
| {1} in {1, 0/0} | undefined |

set equality

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {1} = {1, 1} | true |
| {1 + 2, 5} = {6 - 1, 3} | true |
| {1, 2} = <1, 2> | false |
| {} = {{}} | false |
| {2.5 mod 2} = {0.5} | undefined |

subset

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {} sub {} | true |
| {2, 2} sub {2} | true |
| {6} sub {1, 2, 3} | false |
| {0^0} sub {0^0} | undefined |

binary union

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {1, 2} U {2, 3} | {1, 2, 3} |
| {} U {0.(9..)} | {1} |
| {1..5.6} U {} | undefined |

binary intersection

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {1, 2} sec {2, 3} | {2} |
| {} sec {{}} | {} |
| {1}U{2} sec {} | {1} |
| {} sec {2 mod 1.2} | undefined |

set difference

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {1, 2} \ {1.(9..), 3} | {1} |
| {{}, {{}}} \ {} | {{}, {{}}} |
| {1..3} \ {1, 2}\{1} | {3} |
| {} \ {1..4.4} | undefined |

set cross product

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {1, 2} \* {30} | {(1, 30), (2, 30)} |
| {1, 2} \* {} | {} |
| {1, 2} \* {3, 4}\*{5} | {((1, 3), 5), ((1, 4), 5), ((2, 3), 5), ((2, 4), 5)} |
| {} \* {2..5.7} | undefined |

cardinality

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| |{1, 2, 3}| | 3 |
| |{}| | 0 |
| |{{}}| | 1 |
| |{|{}|}| | 1 |
| |{3.5..6}| | undefined |

power set

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| pow({1, 2}) | {{}, {1}, {2}, {1, 2}} |
| pow({1}) | {{}, {1}} |
| pow(pow({1})) | {{}, {{}}, {{1}}, {{}, {1}}} |
| pow({}) | {{}} |
| pow(pow({})) | {{}, {{}}} |
| |pow({|pow({})|})| | 2 |
| pow({1/0}) | undefined |

Quantification

existential

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| some v in {1, 2, 3} . v in {2, 4, 6} | true |
| some v in {} . false | false |
| some v in {0} . v/0 = 1 | undefined |

universal

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| all v in {1, 2, 3} . (v in {2, 4, 6} => v < 3) | true |
| all v in {1, 3} . (v in {-5..5} & v mod 2 = 1) | true |
| all v in {} . false | true |
| all v in {1, 2} . v in {-3.(9..)..0.(9..)} | false |
| all v in {1, 2} . v > 1 | false |
| all v in {} . v mod -1 = 0 | undefined |

Aggregation

set comprehension

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| {|x| | x in {-2..2}} | {0, 1, 2} |
| |{y / x | (x, y) in {(1, 1), (2, 2), (3, 3)}}| | 1 |
| {x^0 | x in {-1..1}} | undefined |

summation

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| Sum[x in {1, 2}] x\*10 | 30 |
| Sum[x in {2..1}] x^2 | 0 |
| Sum[x in {3..-3.5}] x | undefined |

aggregate product

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| Prod[x in {1..3}]x | 6 |
| Prod[x in {}]x\*10 | 1 |
| Prod[x in {-1..1}]x^x | undefined |

union

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| U[x in {-2..2}]{x^2} | {0, 1, 4} |
| U[x in {}]{x} | undefined |

intersection

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| Sec[x in {0, 1, 2}]{x^2} | {} |
| Sec[x in {}]{x} | undefined |

Lambda Calculus

application

|  |  |
| --- | --- |
| RAW EXPRESSION | EVALUATED EXPRESSION |
| lam a . a^2 @ 4 | 16 |
| lam a,b . a+b @ (1, 2) | 3 |
| lam a,b . a+b @ 1 | undefined |
| lam a,b . a+b @ (1, 2, 3) | undefined |
| lam x . x^x @ 0 | undefined |