Rules of the language:

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LR(1) grammar ('' is ε):
(0) P -> !b SL !e
(1) SL -> S
(2) SL -> S ; SL
(3) S -> IS
(4) S -> W
(5) S -> D
(6) S -> A
(7) S -> F
(8) IS -> $i ( BE ) S
(9) W -> $w ( BE ) S
(10) F -> $f ( INTID >> INTLIT ) : S
(11) D -> INTID VARID
(11) A -> VARID = E
(12) E -> T
(12) E -> T * T
(13) E -> T + T
(13) T -> F
(14) T -> F / F
(14) T -> F - F
(15) T -> F % F
(15) F -> VARID
(16) F -> INTLIT
(16) F -> ( E )
(17) BE -> BREL
(17) BE -> BREL != BREL
     BE -> BREL == BREL
     BREL -> BEXPR
     BREL -> BEXPR >= BEXPR
     BREL -> BEXPR <= BEXPR
     BREL -> BEXPR > BEXPR
     BREL -> BEXPR < BEXPR
     BEXPR -> BTERM
     BEXPR -> BTERM * BTERM
     BEXPR -> BTERM + BTERM
     BTERM -> BFAC
     BTERM -> BFAC / BFAC
     BTERM -> BFAC % BFAC
     BTERM -> BFAC - BFAC
     BFAC -> VARID
     BFAC -> INTLIT
     BFAC -> ( E )
```

FIRST table

Nonterminal	FIRST
P	{!b}
SL	{$i,$w,INTID,VARID,$f,INTLIT,(}
S	{$i,$w,INTID,VARID,$f,INTLIT,(}
IS	{$i}
W	{$w}
F	{$f,VARID,INTLIT,(}
D	{INTID}
A	{VARID}
E	{$f,VARID,INTLIT,(}
T	{$f,VARID,INTLIT,(}
BE	{VARID,INTLIT,(}
BREL	{VARID,INTLIT,(}
BEXPR	{VARID,INTLIT,(}
BTERM	{VARID,INTLIT,(}
BFAC	{VARID,INTLIT,(}

Parse Table of this language:

LR table

| State | ACTION | | |

| | | |

| | | |

| | | |

| | | |

Code Sample 1: !b $w (VARID >= INTLIT) VARID = VARID + INTLIT !e PASS

Input (tokens): !b $w (VARID >= INTLIT) VARID = VARID + INTLIT !e

Maximum number of steps: 100

PARSE

Trace				Tree
Step	Stack	Input	Action	
1	0	!b $w (VARID >= INTLIT) VARID = VARID + INTLIT !e $	s1	!b
2	0 !b 1	$w (VARID >= INTLIT) VARID = VARID + INTLIT !e $	s10	
3	0 !b 1 $w 10	(VARID >= INTLIT) VARID = VARID + INTLIT !e $	s19	
4	0 !b 1 $w 10 (19	VARID >= INTLIT) VARID = VARID + INTLIT !e $	s36	
5	0 !b 1 $w 10 (19 VARID 36	>= INTLIT) VARID = VARID + INTLIT !e $	r_{38}	
6	0 !b 1 $w 10 (19 BFAC	>= INTLIT) VARID = VARID + INTLIT !e $	35	
7	0 !b 1 $w 10 (19 BFAC 35	>= INTLIT) VARID = VARID + INTLIT !e $	r_{34}	
8	0 !b 1 $w 10 (19 BTERM	>= INTLIT) VARID = VARID + INTLIT !e $	34	
9	0 !b 1 $w 10 (19 BTERM 34	>= INTLIT) VARID = VARID + INTLIT !e $	r_{31}	
10	0 !b 1 $w 10 (19 BEXPR	>= INTLIT) VARID = VARID + INTLIT !e $	33	
11	0 !b 1 $w 10 (19 BEXPR 33	>= INTLIT) VARID = VARID + INTLIT !e $	s59	
12	0 !b 1 $w 10 (19 BEXPR 33 >= 59	INTLIT) VARID = VARID + INTLIT !e $	s107	
13	0 !b 1 $w 10 (19 BEXPR 33 >= 59 INTLIT 107	) VARID = VARID + INTLIT !e $	r_{39}	
14	0 !b 1 $w 10 (19 BEXPR 33 >= 59 BFAC	) VARID = VARID + INTLIT !e $	105	
15	0 !b 1 $w 10 (19 BEXPR 33 >= 59 BFAC 105	) VARID = VARID + INTLIT !e $	r_{34}	
16	0 !b 1 $w 10 (19 BEXPR 33 >= 59 BTERM	) VARID = VARID + INTLIT !e $	104	
17	0 !b 1 $w 10 (19 BEXPR 33 >= 59 BTERM 104	) VARID = VARID + INTLIT !e $	r_{31}	
18	0 !b 1 $w 10 (19 BEXPR 33 >= 59 BEXPR	) VARID = VARID + INTLIT !e $	103	
19	0 !b 1 $w 10 (19 BEXPR 33 >= 59 BEXPR 103	) VARID = VARID + INTLIT !e $	r_{27}	
20	0 !b 1 $w 10 (19 BREL	) VARID = VARID + INTLIT !e $	32	
21	0 !b 1 $w 10 (19 BREL 32	) VARID = VARID + INTLIT !e $	r_{23}	
22	0 !b 1 $w 10 (19 BE	) VARID = VARID + INTLIT !e $	39	
23	0 !b 1 $w 10 (19 BE 39	) VARID = VARID + INTLIT !e $	s69	
24	0 !b 1 $w 10 (19 BE 39) 69	VARID = VARID + INTLIT !e $	s12	
25	0 !b 1 $w 10 (19 BE 39) 69 VARID 12	= VARID + INTLIT !e $	s21	
26	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21	VARID + INTLIT !e $	s44	
27	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 VARID 44	+ INTLIT !e $	r_{20}	
28	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 F	+ INTLIT !e $	42	
29	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 F 42	+ INTLIT !e $	r_{16}	
30	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T	+ INTLIT !e $	41	
31	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41	+ INTLIT !e $	s71	
32	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41 + 71	INTLIT !e $	s130	
33	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41 + 71 INTLIT 130	!e $	r_{21}	
34	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41 + 71 F	!e $	127	
35	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41 + 71 F 127	!e $	r_{16}	
36	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41 + 71 T	!e $	132	
37	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 T 41 + 71 T 132	!e $	r_{15}	
38	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 E	!e $	40	
39	0 !b 1 $w 10 (19 BE 39) 69 VARID 12 = 21 E 40	!e $	r_{12}	
40	0 !b 1 $w 10 (19 BE 39) 69 A	!e $	7	
41	0 !b 1 $w 10 (19 BE 39) 69 A 7	!e $	r_{6}	
42	0 !b 1 $w 10 (19 BE 39) 69 S	!e $	125	
43	0 !b 1 $w 10 (19 BE 39) 69 S 125	!e $	r_{9}	
44	0 !b 1 W	!e $	5	
45	0 !b 1 W 5	!e $	r_{4}	
46	0 !b 1 S	!e $	3	
47	0 !b 1 S 3	!e $	r_{1}	
48	0 !b 1 SL	!e $	2	
49	0 !b 1 SL 2	!e $	s16	
50	0 !b 1 SL 2 !e 16	$	acc	

Code Sample 2: !b $i (VARID >= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e

PASS

Input (tokens): !b $i (VARID >= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e

Maximum number of steps: 100

PARSE

Trace				Tree
Step	Stack	Input	Action	
1	0	!b $i (VARID >= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	s1	!b
2	0 !b 1	$i (VARID >= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	s9	
3	0 !b 1 $i 9	(VARID >= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	s18	
4	0 !b 1 $i 9 (18	VARID >= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	s36	
5	0 !b 1 $i 9 (18 VARID 36	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	r_{38}	
6	0 !b 1 $i 9 (18 BFAC	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	35	
7	0 !b 1 $i 9 (18 BFAC 35	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	r_{34}	
8	0 !b 1 $i 9 (18 BTERM	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	34	
9	0 !b 1 $i 9 (18 BTERM 34	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	r_{31}	
10	0 !b 1 $i 9 (18 BEXPR	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	33	
11	0 !b 1 $i 9 (18 BEXPR 33	>= INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	s59	
12	0 !b 1 $i 9 (18 BEXPR 33 >= 59	INTLIT) VARID = VARID + (INTLIT % INTLIT) !e $	s107	
13	0 !b 1 $i 9 (18 BEXPR 33 >= 59 INTLIT 107	) VARID = VARID + (INTLIT % INTLIT) !e $	r_{39}	
14	0 !b 1 $i 9 (18 BEXPR 33 >= 59 BFAC	) VARID = VARID + (INTLIT % INTLIT) !e $	105	
15	0 !b 1 $i 9 (18 BEXPR 33 >= 59 BFAC 105	) VARID = VARID + (INTLIT % INTLIT) !e $	r_{34}	
16	0 !b 1 $i 9 (18 BEXPR 33 >= 59 BTERM	) VARID = VARID + (INTLIT % INTLIT) !e $	104	
17	0 !b 1 $i 9 (18 BEXPR 33 >= 59 BTERM 104	) VARID = VARID + (INTLIT % INTLIT) !e $	r_{31}	
18	0 !b 1 $i 9 (18 BEXPR 33 >= 59 BEXPR	) VARID = VARID + (INTLIT % INTLIT) !e $	103	
19	0 !b 1 $i 9 (18 BEXPR 33 >= 59 BEXPR 103	) VARID = VARID + (INTLIT % INTLIT) !e $	r_{27}	
20	0 !b 1 $i 9 (18 BREL	) VARID = VARID + (INTLIT % INTLIT) !e $	32	
21	0 !b 1 $i 9 (18 BREL 32	) VARID = VARID + (INTLIT % INTLIT) !e $	r_{23}	
22	0 !b 1 $i 9 (18 BE	) VARID = VARID + (INTLIT % INTLIT) !e $	31	
23	0 !b 1 $i 9 (18 BE 31	) VARID = VARID + (INTLIT % INTLIT) !e $	s56	
24	0 !b 1 $i 9 (18 BE 31) 56	VARID = VARID + (INTLIT % INTLIT) !e $	s12	
25	0 !b 1 $i 9 (18 BE 31) 56 VARID 12	= VARID + (INTLIT % INTLIT) !e $	s21	
26	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21	VARID + (INTLIT % INTLIT) !e $	s44	
27	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 VARID 44	+ (INTLIT % INTLIT) !e $	r_{20}	
28	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 F	+ (INTLIT % INTLIT) !e $	42	
29	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 F 42	+ (INTLIT % INTLIT) !e $	r_{16}	
30	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T	+ (INTLIT % INTLIT) !e $	41	
31	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41	+ (INTLIT % INTLIT) !e $	s71	
32	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71	(INTLIT % INTLIT) !e $	s131	
33	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131	INTLIT % INTLIT) !e $	s28	
34	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 INTLIT 28	% INTLIT) !e $	r_{21}	
35	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 F	% INTLIT) !e $	25	
36	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 F 25	% INTLIT) !e $	s53	
37	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 F 25 % 53	INTLIT) !e $	s88	
38	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 F 25 % 53 INTLIT 88	) !e $	r_{21}	
39	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 F 25 % 53 F	) !e $	91	
40	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 F 25 % 53 F 91	) !e $	r_{19}	
41	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 T	) !e $	24	
42	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 T 24	) !e $	r_{13}	
43	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 E	) !e $	176	
44	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 E 176	) !e $	s241	
45	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 (131 E 176) 241	!e $	r_{22}	
46	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 F	!e $	127	
47	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 F 127	!e $	r_{16}	
48	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 T	!e $	132	
49	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 T 41 + 71 T 132	!e $	r_{15}	
50	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 E	!e $	40	
51	0 !b 1 $i 9 (18 BE 31) 56 VARID 12 = 21 E 40	!e $	r_{12}	
52	0 !b 1 $i 9 (18 BE 31) 56 A	!e $	7	
53	0 !b 1 $i 9 (18 BE 31) 56 A 7	!e $	r_{6}	
54	0 !b 1 $i 9 (18 BE 31) 56 S	!e $	94	
55	0 !b 1 $i 9 (18 BE 31) 56 S 94	!e $	r_{8}	
56	0 !b 1 IS	!e $	4	
57	0 !b 1 IS 4	!e $	r_{3}	
58	0 !b 1 S	!e $	3	
59	0 !b 1 S 3	!e $	r_{1}	
60	0 !b 1 SL	!e $	2	
61	0 !b 1 SL 2	!e $	s16	
62	0 !b 1 SL 2 !e 16	$	acc	

Code Sample 3: !b $i (VARID >< INTLIT) VARID = INTLIT !e FAIL

Input (tokens): !b $i (VARID >< INTLIT) VARID = INTLIT !e

Maximum number of steps: 100

PARSE

Trace				Tree
Step	Stack	Input	Action	
1	0	!b $i (VARID >< INTLIT) VARID = INTLIT !e $	s1	
2	0 !b 1	$i (VARID >< INTLIT) VARID = INTLIT !e $	s9	
3	0 !b 1 $i 9	(VARID >< INTLIT) VARID = INTLIT !e $	s18	
4	0 !b 1 $i 9 (18	VARID >< INTLIT) VARID = INTLIT !e $	s36	
5	0 !b 1 $i 9 (18 VARID 36	>< INTLIT) VARID = INTLIT !e $		

Code Sample 4: !b $f (INTID >> INTLIT) VARID = INTLIT !e FAIL

Input (tokens): !b $f (INTID >> INTLIT) VARID = INTLIT !e

Maximum number of steps: 100

PARSE

Trace				Tree
Step	Stack	Input	Action	
1	0	!b $f (INTID >> INTLIT) VARID = INTLIT !e $	s1	
2	0 !b 1	$f (INTID >> INTLIT) VARID = INTLIT !e $	s13	
3	0 !b 1 $f 13	(INTID >> INTLIT) VARID = INTLIT !e $	s22	
4	0 !b 1 $f 13 (22	INTID >> INTLIT) VARID = INTLIT !e $	s47	
5	0 !b 1 $f 13 (22 INTID 47	>> INTLIT) VARID = INTLIT !e $	s77	
6	0 !b 1 $f 13 (22 INTID 47 >> 77	INTLIT) VARID = INTLIT !e $	s142	
7	0 !b 1 $f 13 (22 INTID 47 >> 77 INTLIT 142	) VARID = INTLIT !e $	s180	
8	0 !b 1 $f 13 (22 INTID 47 >> 77 INTLIT 142) 180	VARID = INTLIT !e $		