LR(1) grammar ('' is ε):

```
(0) E -> E + T
(1) E -> E * T
(2) E -> T
(3) T -> T - F
(4) T -> T / F
(5) T -> T % F
(6) T -> F
(7) F -> ( E )
(8) F -> id
(9) F -> int
```

>>

FIRST table	
Nonterminal	**FIRST**
E	{(,id,int}
T	{(,id,int}
F	{(,id,int}

Goto	Kernel	State	
	{[E -> .E + T, $/+/*]}	0	{[E -> .E + T, $/+/
goto(0, E)	{[E -> E.+ T, $/+/*]; [E -> E.* T, +/*]}	1	{[E -> E.+ T, $/+/
goto(0, T)	{[E -> T., +/*]; [T -> T.- F, +/*/-///%]; [T -> T./ F, +/*/-///%]; [T -> T.% F, +/*/-///%]}	2	{[E -> T., +/*]; [
goto(0, F)	{[T -> F., +/*/-///%]}	3	{[T -> F., +/*/-//
goto(0, ()	{[F -> (.E), +/*/-///%]}	4	{[F -> (.E), +/*/
goto(0, id)	{[F -> id., +/*/-///%]}	5	{[F -> id., +/*/-/
goto(0, int)	{[F -> int., +/*/-///%]}	6	{[F -> int., +/*/-
goto(1, +)	{[E -> E +.T, $/+/*]}	7	{[E -> E +.T, $/+/
goto(1, *)	{[E -> E *.T, +/*]}	8	{[E -> E *.T, +/*]
goto(2, -)	{[T -> T -.F, +/*/-///%]}	9	{[T -> T -.F, +/*/
goto(2, /)	{[T -> T /.F, +/*/-///%]}	10	{[T -> T /.F, +/*/
goto(2, %)	{[T -> T %.F, +/*/-///%]}	11	{[T -> T %.F, +/*/
goto(4, E)	{[F -> (E.), +/*/-///%]; [E -> E.+ T,)/+/*]; [E -> E.* T,)/+/*]}	12	{[F -> (E.), +/*/
goto(4, T)	{[E -> T.,)/+/*]; [T -> T.- F,)/+/*/-///%]; [T -> T./ F,)/+/*/-///%]; [T -> T.% F,)/+/*/-///%]}	13	{[E -> T.,)/+/*];
goto(4, F)	{[T -> F.,)/+/*/-///%]}	14	{[T -> F.,)/+/*/-
goto(4, ()	{[F -> (.E),)/+/*/-///%]}	15	{[F -> (.E),)/+/
goto(4, id)	{[F -> id.,)/+/*/-///%]}	16	{[F -> id.,)/+/*/
goto(4, int)	{[F -> int.,)/+/*/-///%]}	17	{[F -> int.,)/+/*
goto(7, T)	{[E -> E + T., $/+/*]; [T -> T.- F, $/+/*/-///%]; [T -> T./ F, $/+/*/-///%]; [T -> T.% F, $/+/*/-///%]}	18	{[E -> E + T., $/+
goto(7, F)	{[T -> F., $/+/*/-///%]}	19	{[T -> F., $/+/*/-
goto(7, ()	{[F -> (.E), $/+/*/-///%]}	20	{[F -> (.E), $/+/
goto(7, id)	{[F -> id., $/+/*/-///%]}	21	{[F -> id., $/+/*/
goto(7, int)	{[F -> int., $/+/*/-///%]}	22	{[F -> int., $/+/*
goto(8, T)	{[E -> E * T., +/*]; [T -> T.- F, +/*/-///%]; [T -> T./ F, +/*/-///%]; [T -> T.% F, +/*/-///%]}	23	{[E -> E * T., +/*
goto(8, F)	{[T -> F., +/*/-///%]}	3	
goto(8, ()	{[F -> (.E), +/*/-///%]}	4	
goto(8, id)	{[F -> id., +/*/-///%]}	5	
goto(8, int)	{[F -> int., +/*/-///%]}	6	
goto(9, F)	{[T -> T - F., +/*/-///%]}	24	{[T -> T - F., +/*
goto(9, ()	{[F -> (.E), +/*/-///%]}	4	
goto(9, id)	{[F -> id., +/*/-///%]}	5	
goto(9, int)	{[F -> int., +/*/-///%]}	6	
goto(10, F)	{[T -> T / F., +/*/-///%]}	25	{[T -> T / F., +/*
goto(10, ()	{[F -> (.E), +/*/-///%]}	4	
goto(10, id)	{[F -> id., +/*/-///%]}	5	
goto(10, int)	{[F -> int., +/*/-///%]}	6	
goto(11, F)	{[T -> T % F., +/*/-///%]}	26	{[T -> T % F., +/*
goto(11, ()	{[F -> (.E), +/*/-///%]}	4	
goto(11, id)	{[F -> id., +/*/-///%]}	5	
goto(11, int)	{[F -> int., +/*/-///%]}	6	
goto(12,))	{[F -> (E)., +/*/-///%]}	27	{[F -> (E)., +/*
goto(12, +)	{[E -> E +.T,)/+/*]}	28	{[E -> E +.T,)/+/
goto(12, *)	{[E -> E *.T,)/+/*]}	29	{[E -> E *.T,)/+/
goto(13, -)	{[T -> T -.F,)/+/*/-///%]}	30	{[T -> T -.F,)/+/
goto(13, /)	{[T -> T /.F,)/+/*/-///%]}	31	{[T -> T /.F,)/+/
goto(13, %)	{[T -> T %.F,)/+/*/-///%]}	32	{[T -> T %.F,)/+/
goto(15, E)	{[F -> (E.),)/+/*/-///%]; [E -> E.+ T,)/+/*]; [E -> E.* T,)/+/*]}	33	{[F -> (E.),)/+/

Goto	Kernel	State	
goto(15, T)	{[E -> T.,)/+/*]; [T -> T.- F,)/+/*/-///%]; [T -> T./ F,)/+/*/-///%]; [T -> T.% F,)/+/*/-///%]}	13	
goto(15, F)	{[T -> F.,)/+/*/-///%]}	14	
goto(15, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(15, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(15, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(18, -)	{[T -> T -.F, $/+/*/-///%]}	34	{[T -> T -.F, $/+/
goto(18, /)	{[T -> T /.F, $/+/*/-///%]}	35	{[T -> T /.F, $/+/
goto(18, %)	{[T -> T %.F, $/+/*/-///%]}	36	{[T -> T %.F, $/+/
goto(20, E)	{[F -> (E.), $/+/*/-///%]; [E -> E.+ T,)/+/*]; [E -> E.* T,)/+/*]}	37	{[F -> (E.), $/+/
goto(20, T)	{[E -> T.,)/+/*]; [T -> T.- F,)/+/*/-///%]; [T -> T./ F,)/+/*/-///%]; [T -> T.% F,)/+/*/-///%]}	13	
goto(20, F)	{[T -> F.,)/+/*/-///%]}	14	
goto(20, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(20, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(20, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(23, -)	{[T -> T -.F, +/*/-///%]}	9	
goto(23, /)	{[T -> T /.F, +/*/-///%]}	10	
goto(23, %)	{[T -> T %.F, +/*/-///%]}	11	
goto(28, T)	{[E -> E + T.,)/+/*]; [T -> T.- F,)/+/*/-///%]; [T -> T./ F,)/+/*/-///%]; [T -> T.% F,)/+/*/-///%]}	38	{[E -> E + T.,)/+
goto(28, F)	{[T -> F.,)/+/*/-///%]}	14	
goto(28, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(28, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(28, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(29, T)	{[E -> E * T.,)/+/*]; [T -> T.- F,)/+/*/-///%]; [T -> T./ F,)/+/*/-///%]; [T -> T.% F,)/+/*/-///%]}	39	{[E -> E * T.,)/+
goto(29, F)	{[T -> F.,)/+/*/-///%]}	14	
goto(29, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(29, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(29, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(30, F)	{[T -> T - F.,)/+/*/-///%]}	40	{[T -> T - F.,)/+
goto(30, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(30, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(30, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(31, F)	{[T -> T / F.,)/+/*/-///%]}	41	{[T -> T / F.,)/+
goto(31, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(31, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(31, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(32, F)	{[T -> T % F.,)/+/*/-///%]}	42	{[T -> T % F.,)/+
goto(32, ()	{[F -> (.E),)/+/*/-///%]}	15	
goto(32, id)	{[F -> id.,)/+/*/-///%]}	16	
goto(32, int)	{[F -> int.,)/+/*/-///%]}	17	
goto(33,))	{[F -> (E).,)/+/*/-///%]}	43	{[F -> (E).,)/+
goto(33, +)	{[E -> E +.T,)/+/*]}	28	
goto(33, *)	{[E -> E *.T,)/+/*]}	29	
goto(34, F)	{[T -> T - F., $/+/*/-///%]}	44	{[T -> T - F., $/+
goto(34, ()	{[F -> (.E), $/+/*/-///%]}	20	
goto(34, id)	{[F -> id., $/+/*/-///%]}	21	
goto(34, int)	{[F -> int., $/+/*/-///%]}	22	
goto(35, F)	{[T -> T / F., $/+/*/-///%]}	45	{[T -> T / F., $/+

Goto	Kernel	State	
goto(35, ()	{[F -> (.E), $/+/*/-///%]}	20	
goto(35, id)	{[F -> id., $/+/*/-///%]}	21	
goto(35, int)	{[F -> int., $/+/*/-///%]}	22	
goto(36, F)	{[T -> T % F., $/+/*/-///%]}	46	{[T -> T % F., $/+/
goto(36, ()	{[F -> (.E), $/+/*/-///%]}	20	
goto(36, id)	{[F -> id., $/+/*/-///%]}	21	
goto(36, int)	{[F -> int., $/+/*/-///%]}	22	
goto(37,))	{[F -> (E)., $/+/*/-///%]}	47	{[F -> (E)., $/+/
goto(37, +)	{[E -> E +.T,)/+/*]}	28	
goto(37, *)	{[E -> E *.T,)/+/*]}	29	
goto(38, -)	{[T -> T -.F,)/+/*/-///%]}	30	
goto(38, /)	{[T -> T /.F,)/+/*/-///%]}	31	
goto(38, %)	{[T -> T %.F,)/+/*/-///%]}	32	
goto(39, -)	{[T -> T -.F,)/+/*/-///%]}	30	
goto(39, /)	{[T -> T /.F,)/+/*/-///%]}	31	
goto(39, %)	{[T -> T %.F,)/+/*/-///%]}	32	

LR table

State	ACTION										GOTO		
	+	*	-	/	%	(	)	id	int	$	E	T	F
0						s4		s5	s6		1	2	3
1	s7	s8											
2	r_2	r_2	s9	s10	s11								
3	r_6	r_6	r_6	r_6	r_6								
4						s15		s16	s17		12	13	14
5	r_8	r_8	r_8	r_8	r_8								
6	r_9	r_9	r_9	r_9	r_9								
7						s20		s21	s22			18	19
8						s4		s5	s6			23	3
9						s4		s5	s6				24
10						s4		s5	s6				25
11						s4		s5	s6				26
12	s28	s29					s27						
13	r_2	r_2	s30	s31	s32		r_2						
14	r_6	r_6	r_6	r_6	r_6		r_6						
15						s15		s16	s17		33	13	14
16	r_8	r_8	r_8	r_8	r_8		r_8						
17	r_9	r_9	r_9	r_9	r_9		r_9						
18	acc	acc	s34	s35	s36					acc			
19	r_6	r_6	r_6	r_6	r_6					r_6			
20						s15		s16	s17		37	13	14
21	r_8	r_8	r_8	r_8	r_8					r_8			
22	r_9	r_9	r_9	r_9	r_9					r_9			
23	r_1	r_1	s9	s10	s11								

Input (tokens): id * (id + id)

Maximum number of steps: 100

PARSE

Trace

Step	Stack	Input	Action
1	0	id * (id + id) $	s5
2	0 id 5	* (id + id) $	r_8
3	0 F	* (id + id) $	3
4	0 F 3	* (id + id) $	r_6
5	0 T	* (id + id) $	2
6	0 T 2	* (id + id) $	r_2
7	0 E	* (id + id) $	1
8	0 E 1	* (id + id) $	s8
9	0 E 1 * 8	(id + id) $	s4
10	0 E 1 * 8 (4	id + id) $	s16
11	0 E 1 * 8 (4 id 16	+ id) $	r_8
12	0 E 1 * 8 (4 F	+ id) $	14
13	0 E 1 * 8 (4 F 14	+ id) $	r_6
14	0 E 1 * 8 (4 T	+ id) $	13
15	0 E 1 * 8 (4 T 13	+ id) $	r_2
16	0 E 1 * 8 (4 E	+ id) $	12
17	0 E 1 * 8 (4 E 12	+ id) $	s28
18	0 E 1 * 8 (4 E 12 + 28	id) $	s16
19	0 E 1 * 8 (4 E 12 + 28 id 16	) $	r_8
20	0 E 1 * 8 (4 E 12 + 28 F	) $	14

Tree

LR table

State	ACTION										GOTO		
	+	*	-	/	%	(	)	id	int	$	E	T	F
24	r_3	r_3	r_3	r_3	r_3								
25	r_4	r_4	r_4	r_4	r_4								
26	r_5	r_5	r_5	r_5	r_5								
27	r_7	r_7	r_7	r_7	r_7								
28						s15		s16	s17			38	14
29						s15		s16	s17			39	14
30						s15		s16	s17				40
31						s15		s16	s17				41
32						s15		s16	s17				42
33	s28	s29					s43						
34						s20		s21	s22				44
35						s20		s21	s22				45
36						s20		s21	s22				46
37	s28	s29					s47						
38	acc	acc	s30	s31	s32		acc						
39	r_1	r_1	s30	s31	s32		r_1						
40	r_3	r_3	r_3	r_3	r_3		r_3						
41	r_4	r_4	r_4	r_4	r_4		r_4						
42	r_5	r_5	r_5	r_5	r_5		r_5						
43	r_7	r_7	r_7	r_7	r_7		r_7						
44	r_3	r_3	r_3	r_3	r_3					r_3			
45	r_4	r_4	r_4	r_4	r_4					r_4			
46	r_5	r_5	r_5	r_5	r_5					r_5			
47	r_7	r_7	r_7	r_7	r_7					r_7			

Trace

Step	Stack	Input	Action	Tree
21	0 E 1 * 8 (4 E 12 + 28 F 14	) $	r_6	
22	0 E 1 * 8 (4 E 12 + 28 T	) $	38	
23	0 E 1 * 8 (4 E 12 + 28 T 38	) $	acc	