Assignment 3

- Given the following grammar:

$$E \to E + T \mid T$$

$$T \to T * F \mid F$$

$$F \to x$$

1.1) - Augmenting the grammar:

0) $E' \to E$

I) $E \to E + T$

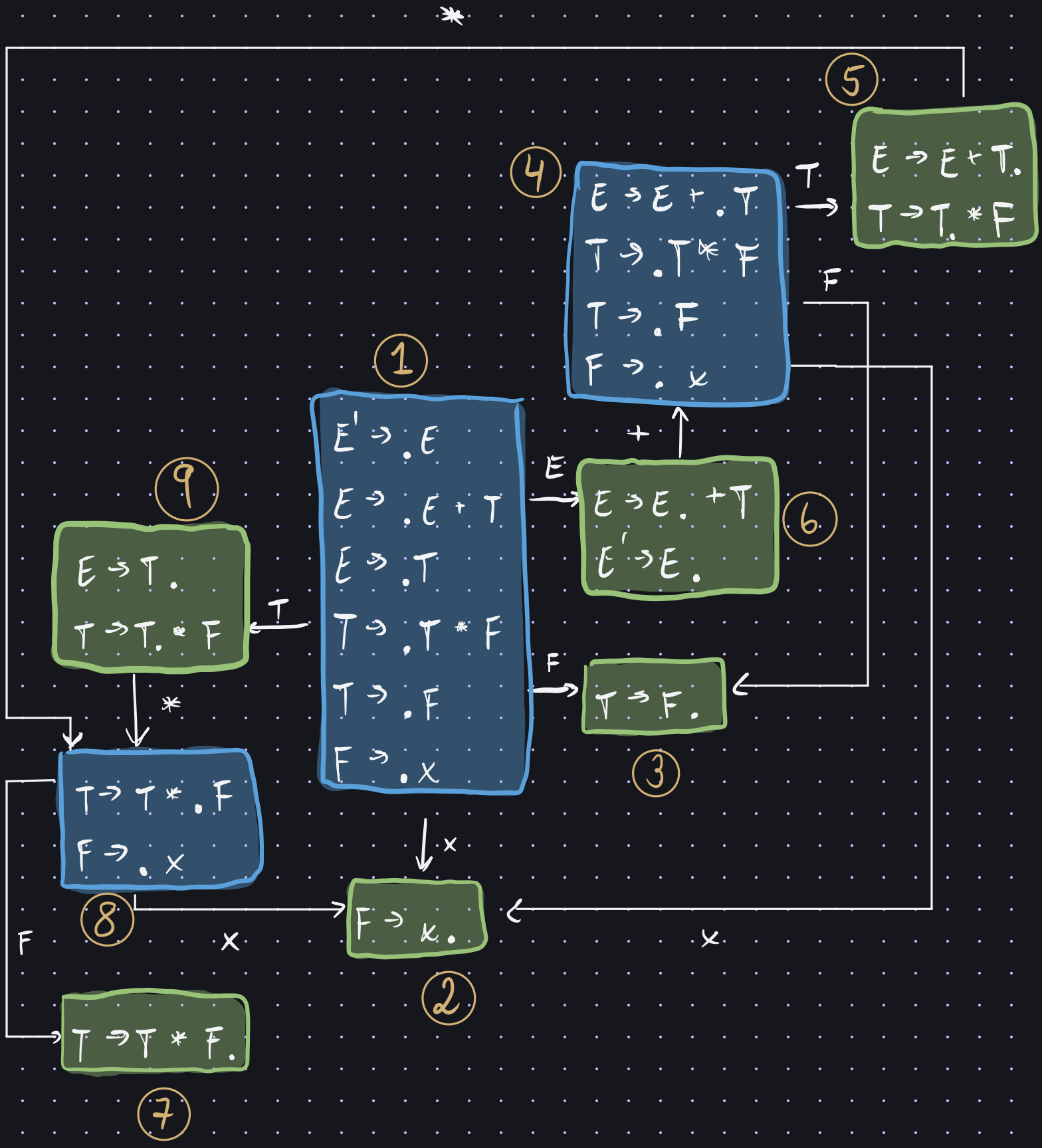
II) $E \to T$

III) $T \to T * F$

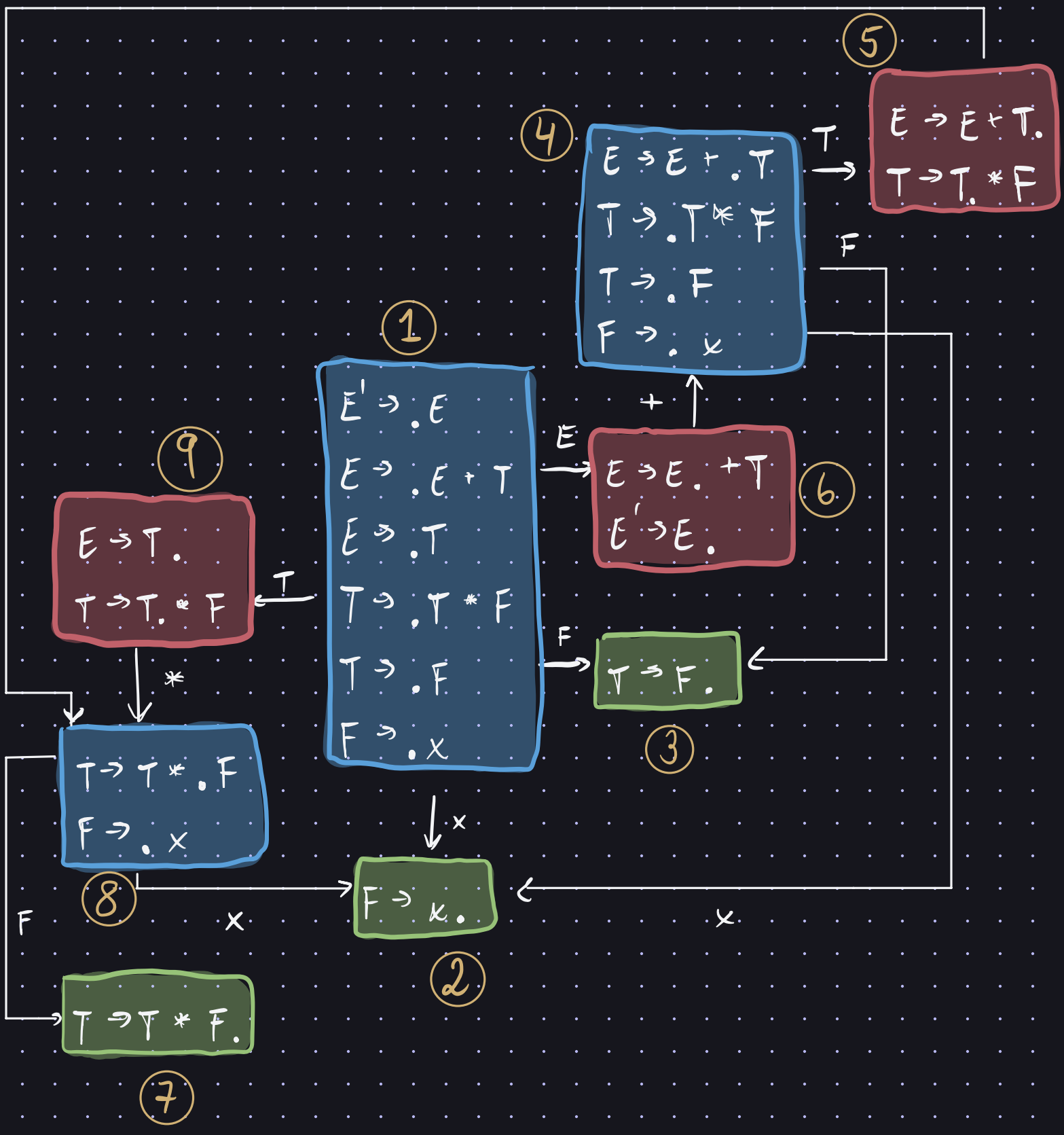
IV) $T \to F$

V) $F \to x$

- Constructing the LR(0) automaton:


1
E' → .E
E → .E + T
E → .T
T → .T * F
T → .F
F → .x
2
F → x.
3
T → F.
4
E → E + .T
T → .T * F
T → .F
F → .x
5
E → E + T.
T → T. * F
6
E → E. + T
E' → E.
7
T → T * F.
8
T → T * .F
F → .x
9
E → T.
T → T. * F
E
T
F
x
+
*

1.2) • We get a shift/reduce conflict if it is ambiguous whether we should shift or reduce. Marked in red.



- We could go to the accepting state and reduce, or we could shift.
- Both would be done with the token T and the token E.
- Creating the LR(0) parsing table:

0) $E' \to E$
I) $E \to E + T$
II) $E \to T$
III) $T \to T * F$
IV) $T \to F$
V) $F \to x$

	+	*	x	$	E	T	F
1			s2		g6	g9	g3
2	rV	rV	rV	rV			
3	rIV	rIV	rIV	rIV			
4			s2			g5	g3
5	rI	s8, rI	rI	rI			
6	s4, r0	r0	r0	a			
7	rIII	rIII	rIII	rIII			
8			s2				g7
9	rII	s8, rII	rII	rII			

● : Shift/reduce conflicts

1.3) • Inspecting the shift/reduce conflicts:

	FOLLOW
E'	\$
E	\$, +
T	\$, *, +
F	\$, *, +

0) $E' \rightarrow E$
I) $E \rightarrow E + T$
II) $E \rightarrow T$
III) $T \rightarrow T * F$
IV) $T \rightarrow F$
V) $F \rightarrow x$

- We can now update the LR(0) parsing table and make it into an SLR parsing table
- When an item "$A \rightarrow \alpha.$" suggests that a state is reducing, we put the reducing action in the table only at tokens in FOLLOW(A)
- We can claim that the grammar is SLR parsable due to the table below:

	+	*	x	$	E	T	F
1			s2		g6	g9	g3
2	rV	rV		rV			
3	rIV	rIV		rIV			
4			s2			g5	g3
5	rI	s8		rI			
6	s4			a			
7	rIII	rIII		rIII			
8			s2				g7
9	rII	s8		rII			

- Observe that there are no longer any shift/reduce conflicts.