

SLR

④

Start \rightarrow List \$

1 List \rightarrow Item " : " List

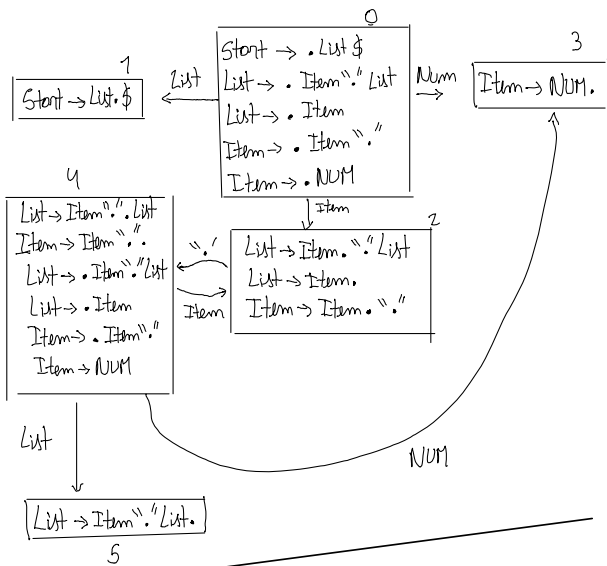
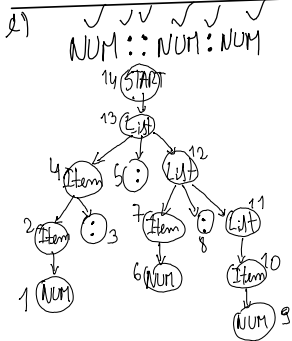
2 List \rightarrow Item

3 Item \rightarrow Itemⁿ!!

4 Item \rightarrow NUM

a) $\text{First}(\text{List}) = \text{First}(\text{Item}) = \{\text{NUM}\}$

$$\text{Follow}(\text{List}) = \text{First}(\$) \setminus \epsilon = \{\$\}$$
$$\text{Follow}(\text{Item}) = \text{First}(":\") \setminus \epsilon \cup \text{Follow}(\text{List}_i)$$

$$= \{":", \$\}$$
$$\text{follow}(\text{start}) = \{ \$ \}$$
$$\text{First}(\text{start}) = \text{First}(\text{List}) = \{\text{NUM}\}$$


	Num	"."	\$	List	Item	Start
0	S ₃			g ₁	g ₂	
1			Acc			
2		s ₄	R ₂			
3		R ₄	R ₄			
4	s ₃	R ₃	R ₃	g ₅		
5			R ₁			

d) A gramática é SLR porque não há shift reduce conflicts. Então também é LALR por SLR pertencer a LALR. Não é, no entanto, LR(0) porque haveriam conflitos a reduzir

f) Nota:

$$A \rightarrow \underline{A\alpha_1} \mid A\alpha_2 \mid A\alpha_3 \mid A\alpha_4 \dots \mid \beta_1 \mid \beta_2 \mid \beta_3 \mid \beta_4 \dots$$
$$A \rightarrow \beta_1 A'$$
$$A' \rightarrow B_2 A'^k$$

2

$$A' \rightarrow \alpha_1 A'$$
$$A' \rightarrow \alpha_2 A'$$

2

$$A' \rightarrow \epsilon$$

Start \rightarrow List \$

List \rightarrow Item OptArgs

OptArgs \rightarrow ":" List

Opt Args $\rightarrow \epsilon$

Item \rightarrow NUM Item'

Item' \rightarrow "Item"

$$\text{Item}' \rightarrow \epsilon$$

Left recursion removed:

Start \rightarrow List \$

List \rightarrow Item ":" List

List \rightarrow Item

Item \rightarrow NUM Item'

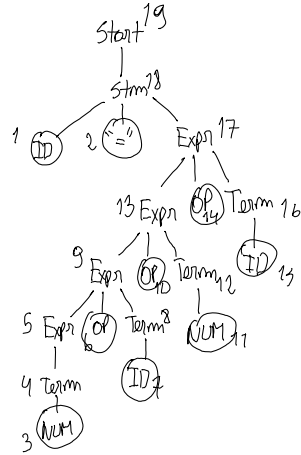
↳ Item \rightarrow "Item"

Item' $\rightarrow \epsilon$

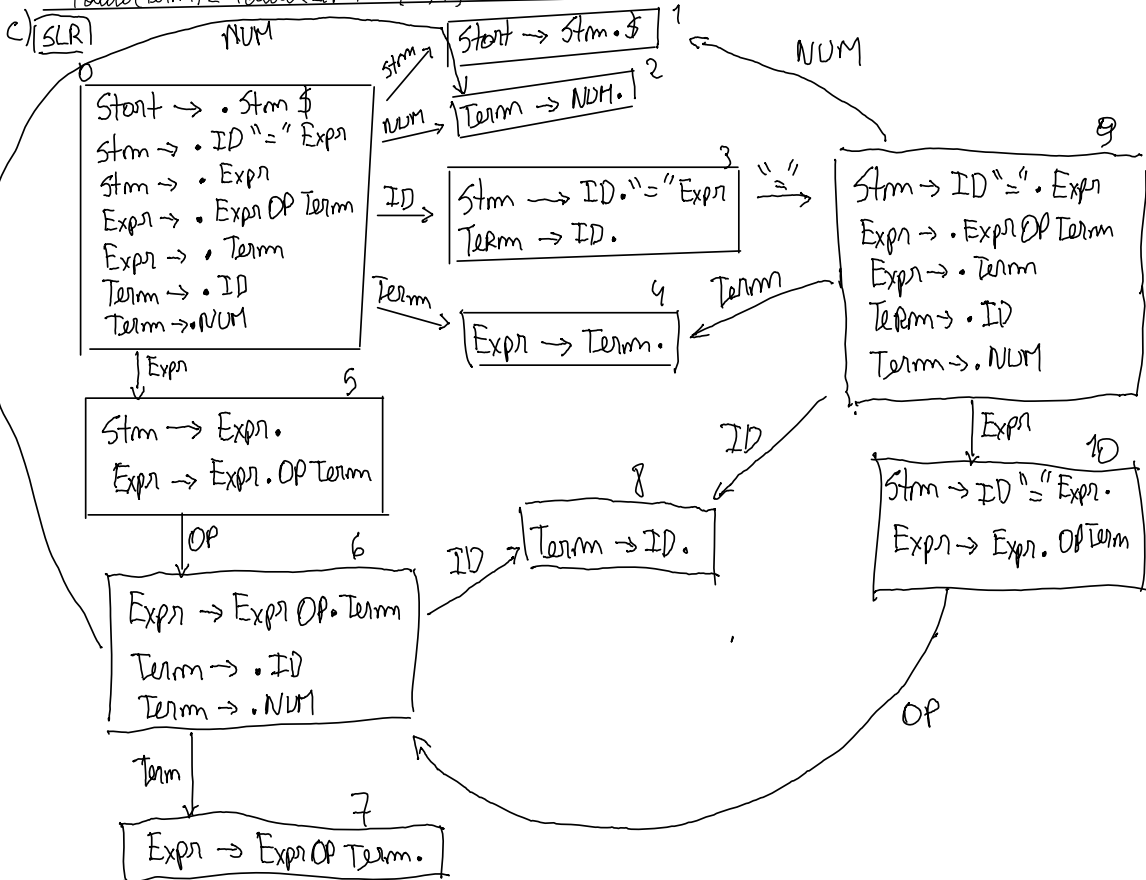
② $Start \rightarrow Strm \$$

a) $Strm \rightarrow ID "=" Expr$
 $Strm \rightarrow Expr$
 $Expr \rightarrow Expr OP Term$
 $Expr \rightarrow Term$
 $Term \rightarrow ID$
 $Term \rightarrow NUM$

$ID "=" NUM OP ID OP NUM OP ID$



b) $First(Strm) = ID \cup First(Expr) = \{ID, NUM\}$
 $First(Expr) = First(Term) = \{ID, NUM\}$
 $First(Term) = \{ID, NUM\}$
 $Follow(Strm) = First(\$) \setminus \epsilon = \{\$ \}$
 $Follow(Expr) = First(OP) \setminus \epsilon \cup Follow(Strm) = \{OP, \$ \}$
 $Follow(Term) = Follow(Expr) = \{OP, \$ \}$



d) SLR

	ID	=	OP	NUM	\$	Start	Stmn	Expr	Term
0	s ₃			s ₂			g ₁	g ₅	g ₄
1					ACC				
2			R ₆		R ₆				
3		s ₉	R ₅		R ₅				
4			R ₄		R ₄				
5			s ₆		R ₂				
6	s ₈			s ₂					g ₇
7			R ₃		R ₃				
8			R ₅		R ₅				
9	s ₈			s ₂				g ₁₀	g ₄
10			s ₆		R ₁				

A gramática é SLR porque não há conflitos na tabela de parse. Não é LR(0) porque haveriam conflitos na tabela por exemplo em $T[s, OP]$. Será LR(1) porque estas gramáticas são um subconjunto das SLR.

③

Gramática Inicial:

$Start \rightarrow Stm \$$
 $Stm \rightarrow ID "=" Expr$
 $Stm \rightarrow Expr$
 $Expr \rightarrow Expr OP Term$
 $Expr \rightarrow Term$
 $Term \rightarrow ID$
 $Term \rightarrow NUM$

Como Remover LR

$A \rightarrow A\alpha_1 | A\alpha_2 \dots | B_1 | B_2 \dots$
 $A \rightarrow \beta_1 A'$
 $A \rightarrow \beta_2 A'$
 $A' \rightarrow \alpha_1 A'$
 $A' \rightarrow \alpha_2 A'$
 $A' \rightarrow \epsilon$

Gramática Final:

$(1) Start \rightarrow Stm \$$
 $(2) Stm \rightarrow ID "=" Expr$
 $(3) Stm \rightarrow Expr$
 $(4) Expr \rightarrow Term A'$
 $(5) A' \rightarrow OP Term A'$
 $(6) A' \rightarrow \epsilon$
 $(7) Term \rightarrow ID$
 $(8) Term \rightarrow NUM$

First(Start) = First(Stm)

First(Expr) = First(Term)

First(Term) = {ID, NUM}

Follow(Start) = { \$ }

Follow(Expr) = Follow(Stm) = { \$ }

Follow(A') = Follow(Expr) = { \$ }

Follow(Term) = First(A') \setminus \epsilon \cup Follow(A') \cup Follow(Expr)

= { OP } \cup { \$ } = { OP, \$ }

First(Stm) = {ID} \cup First(Expr) = {ID, NUM, "="}

First(A') = {OP, \epsilon}

Follow(Stm) = First(\$)\epsilon = { \$ }

Follow(Stm) = { \$ }

Follow(Expr) = Follow(Stm) = { \$ }

Follow(A') = Follow(Expr) = { \$ }

Follow(Term) = First(A') \setminus \epsilon \cup Follow(A') \cup Follow(Expr)

= { OP } \cup { \$ } = { OP, \$ }

	OP	=	ID	NUM	\$
Start			1	1	
Stm			2,3	3	
Expr			4	4	
A'	5				6
Term			7	8	

Não é LL(1) porque tem conflitos, tem um left factor escondido em id

e) O problema está em

$Stm \rightarrow id = Expr$
 $\quad \quad \quad | Expr$
 $\Rightarrow Stm \rightarrow id = Expr$
 $\quad \quad \quad | Term A'$
 $\Rightarrow Stm \rightarrow id = Expr$
 $\quad \quad \quad | id A'$
 $\quad \quad \quad | Num A'$

Start $\rightarrow Stm \$$

$Stm \rightarrow id Stm'$
 $\quad \quad \quad | Num A'$

$Stm' \rightarrow = Expr$
 $\quad \quad \quad | A'$

Expr $\rightarrow Term A'$

A' $\rightarrow OP Term A'$

A' $\rightarrow \epsilon$

$Term \rightarrow id$
 $\quad \quad \quad | num$