

Eliminação Recursão a esquerda

$$\cancel{S ::= Aab \mid Bc \mid ScAb}$$

$$\cancel{A ::= SAc \mid BaA \mid ab}$$

$$\cancel{B ::= Ac \mid aBb \mid ab}$$

$$S ::= \underline{AabS'} \mid \underline{BcS'}$$

$$S' ::= cAbS' \mid \epsilon$$

$$\cancel{A ::= \underline{AabS'Ac} \mid \underline{BcS'Ac} \mid BaA \mid ab}$$

$$A ::= \underline{BcS'AcA'} \mid \underline{BaAA'} \mid \underline{abA'}$$

$$A' ::= \underline{abS'AcA'} \mid \epsilon$$

$$\cancel{B ::= \underline{BcS'AcA'c} \mid \underline{BaAA'c} \mid \underline{abA'c} \mid aBb \mid ab}$$

$$B ::= \underline{abA'cB'} \mid \underline{aBbB'} \mid \underline{abB'}$$

$$B' ::= \underline{cS'AcA'cB'} \mid \underline{aAA'cB'} \mid \epsilon$$

- APND

- Predictive

- LR

# Fatoração

$$S ::= \underline{aSB} \mid \underline{aSA} \mid cA$$

$$A ::= a$$

$$B ::= b$$

$$S \rightarrow \underline{aSB}$$

$$S ::= \underline{aSS'} \mid cA$$

$$S \rightarrow \underline{aSS'} \\ \rightarrow \underline{aSB}$$

$$S' ::= B \mid A$$

~~$$S ::= AC \mid BC$$~~

$$A ::= \underline{aD} \mid cC$$

$$B ::= \underline{aB} \mid dD$$

~~$$C ::= eC \mid eA$$~~

$$D ::= fD \mid AB$$

$$C ::= eC'$$

$$C' ::= C \mid A$$

~~$$S ::= \underline{aDC} \mid cCC \mid \underline{aBC} \mid dDC$$~~

$$S ::= \underline{aS'} \mid cCC \mid dDC$$

$$S' ::= DC \mid AC$$

$$S ::= a \underline{Bd} / a \underline{cD} / bC$$

~~$$B ::= b \underline{Dc} / b \underline{Cd} / ad$$~~

~~$$D ::= cdD / ca \underline{B}$$~~

$$C ::= cbB / adD$$

$$S ::= a S' / bC$$

$$S' ::= Bb / cD$$

$$B ::= bB' / ad$$

~~$$B' ::= Dc / Cd$$~~

$$D ::= cD'$$

$$D' ::= dD / aB$$

~~$$B' ::= c \underline{Dc} / c \underline{Bb} / adDd$$~~

$$B' ::= cB'' / adDd$$

$$B'' ::= D'c / bBd$$

$$E ::= E + E \mid E * E \mid (E) \mid a$$

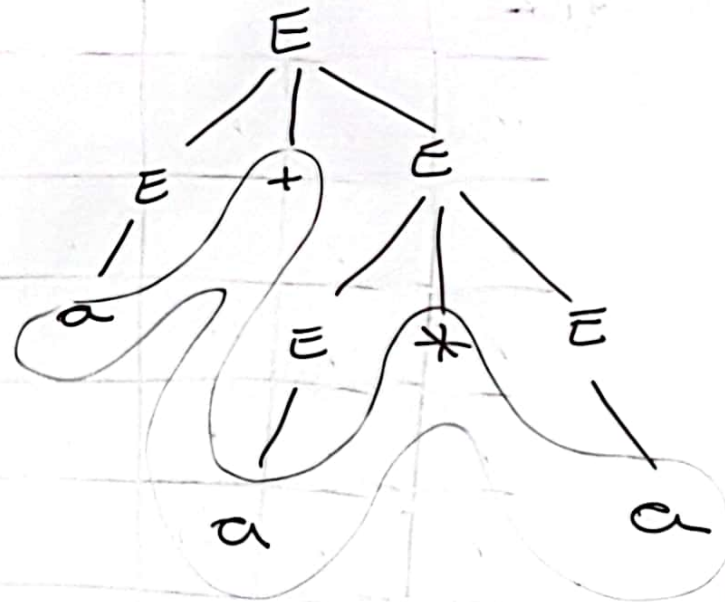
$$E \xrightarrow{1} E + E$$

$$\xrightarrow{4} a + E$$

$$\xrightarrow{2} a + E * E$$

$$\xrightarrow{4} a + a * E$$

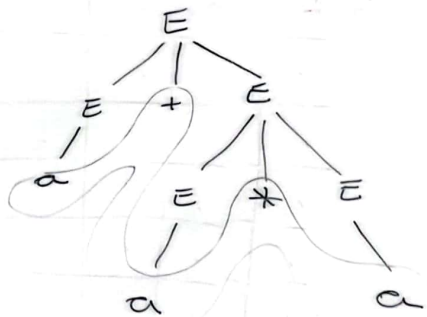
$$\xrightarrow{4} \underline{a + a * a}$$



$E ::= E + E \mid E * E \mid (E) \mid a$

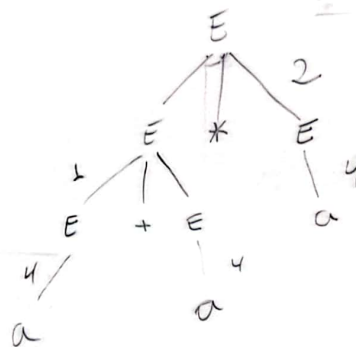
1 4 2 4 4

$E \xrightarrow{1} E + E$   
 $\xrightarrow{4} a + E$   
 $\xrightarrow{2} a + E * E$   
 $\xrightarrow{4} a + a * E$   
 $\xrightarrow{4} a + a * a$



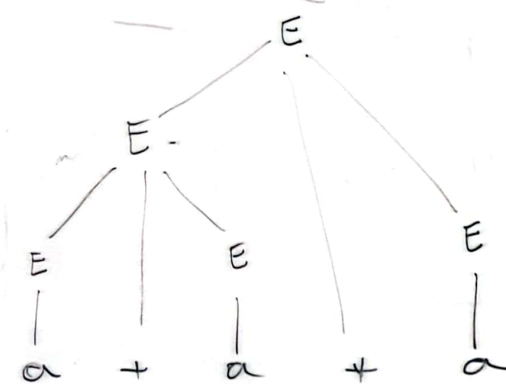
derivação + esq

2 4 1 4 4

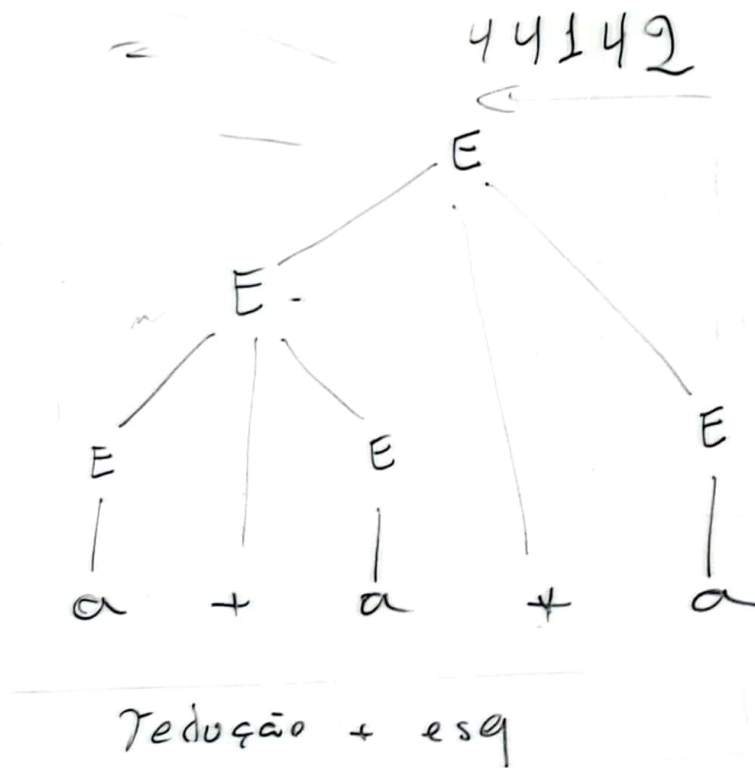
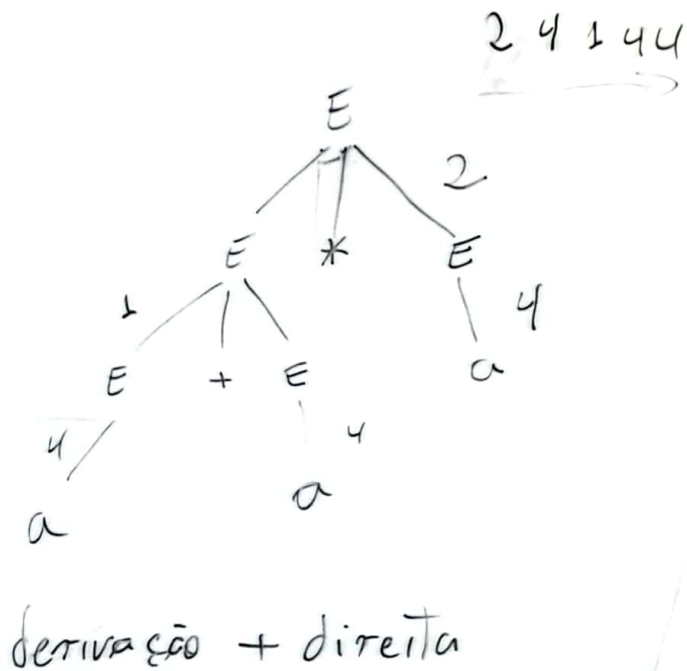
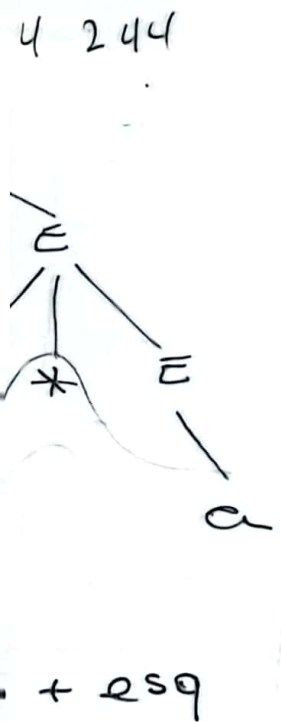


derivação + direita

4 4 1 4 2



redução + esq



FITA: 15 - - - \$





Eliminação de símbolos improdutivos e inalç.

$$\underline{S} ::= \underline{a} \underline{CD} | \underline{ab} | \underline{bB} | \underline{aaS}$$

$$\underline{B} ::= \underline{bbB} | \underline{Daa} | \underline{a}$$

improd. ~~$$\underline{C} ::= \underline{aCa} | \underline{BCb} | \underline{ECab}$$~~

inalç. ~~$$\underline{E} ::= \underline{ab} | \underline{Ea} | \underline{Ba}$$~~

$$\underline{D} ::= \underline{abB} | \underline{ab} | \underline{DD}$$

$$S \rightarrow \{B, S, D\}$$

$$B \rightarrow \{B, D\}$$

$$E \rightarrow \{E, B, D\} \text{ inalç.}$$

$$D \rightarrow \{B, D\}$$

$$S ::= Abc | aBc$$

$$A ::= aAb | AB | Abc | CD$$

$$B ::= bBc | bC | Bc.$$

$$C ::= cCc | cC | CD$$

$$D ::= bbD | Dbc | DD$$

$$E ::= bEc | EC | cc$$



Eliminação de  $\epsilon$ . prod

$$S' ::= S \mid \epsilon$$

$$S ::= \underline{A} \underline{B} \underline{C} \mid a \underline{B} \underline{C} \mid b \underline{C} \mid \underline{B} \underline{C} \mid \underline{A} \underline{C} \mid \underline{B} \underline{A} \mid a \underline{C} \mid a \underline{B} \mid a \mid b$$

$$\underline{A} ::= a \underline{A} a \mid \cancel{\epsilon} \mid aa$$

$$\underline{B} ::= \underline{B} \underline{C} \mid b \underline{B} \mid \cancel{\epsilon} \mid \underline{C} \mid \underline{B} \mid b$$

$$\underline{C} ::= \underline{C} \underline{C} \mid c \underline{C} \mid \cancel{\epsilon} \mid \underline{C} \mid c$$

$$S \rightarrow bC \quad S \rightarrow b$$

$$\rightarrow \underline{b}$$

$$S \rightarrow \cancel{ABC}$$

$$\rightarrow \cancel{BC}$$

$$\rightarrow \cancel{C}$$

$$\rightarrow \cancel{\epsilon} \quad d$$

$$S' \rightarrow \underline{\epsilon}$$

$$S ::= ABS \mid aA$$

$$A ::= \epsilon \mid a$$

$$B ::= Bb \mid cd$$

	First
S	a, c
A	$\epsilon$ , a
B	c

$$S ::= S_yx \mid B_z \mid CA_w \mid AB$$

$$A ::= aCB \mid B_yb \mid bC$$

$$B ::= cAd \mid B_yd \mid aB \mid \epsilon$$

$$C ::= zBd \mid wCc \mid AB_y \mid \epsilon$$

	First
S	c, a, z, w, b, y
A	a, b, c, y
B	c, a, $\epsilon$ , y
C	z, w, a, b, $\epsilon$ , c, y

$S' ::= S\$$   
 $S ::= ABS \mid aA$   
 $A ::= \epsilon \mid a$   
 $B ::= Bb \mid cd$

Se  $A ::= YX\alpha$   
 $FO(X) = FIRST(\alpha)$   
 Se  $A ::= \alpha X$   
 $FO(X) = F(X) + F(A)$

	First	Follow
S	a, c	\$
A	$\epsilon$ , a	c, \$
B	c	a, c, b

$S ::= S_y x \mid B_z \mid C A_w \mid A B$   
 $A ::= a C B \mid B_y b \mid b C$   
 $B ::= c A d \mid B_y d \mid a B \mid \epsilon$   
 $C ::= z B d \mid w C c \mid A B_y \mid \epsilon$

	First	Follow
S	c, a, z, w, b, y	
A	a, b, c, y	
B	c, a, $\epsilon$ , y	
C	z, w, a, b, $\epsilon$ , c, y	

$S' ::= \cdot S \$$   
 $\textcircled{S}$   
 $\uparrow \downarrow$   
 $a + a$   
 $\rightarrow$

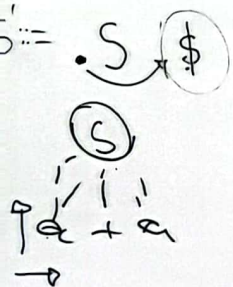
$S' ::= S\$$   
 $S ::= ABS \mid aA$   
 $A ::= \epsilon \mid a$   
 $B ::= Bb \mid cd$

Se  $A ::= YX\alpha$   
 $FO(X) = FIRST(\alpha)$   
 Se  $A ::= \alpha X$   
 $FO(X) = F(X) + F(A)$

	FIRST	FOLLOW
S	a, c	\$
A	$\epsilon$ , a	c, \$
B	c	a, c, b

$S' ::= S\$$   
 $S ::= S_yx \mid B_z \mid CA_w \mid AB$   
 $A ::= \alpha CB \mid \beta yb \mid \underline{b}C$   
 $B ::= \underline{c}Ad \mid \beta yd \mid \alpha B \mid \epsilon$   
 $C ::= \underline{z}Bd \mid \underline{w}Cc \mid \underline{A}By \mid \epsilon$

	FIRST	FOLLOW
S	c, a, z, w, b, y	\$, y
A	a, b, c, y	w, c, a, y, d, \$
B	c, a, $\epsilon$ , y	z, y, d, \$, w, a
C	z, w, a, b, $\epsilon$ , c, y	a, b, c, y



$$S \Rightarrow A \Rightarrow Y/X$$

$$F_0(X) = F_0(Y)$$

$$S \Rightarrow A \Rightarrow X$$

$$F_0(X) = F(X) - F(A)$$

$$S' = \delta S$$

$$S = \delta y x | B z | C A w | \epsilon \delta$$

$$B \Rightarrow \epsilon C B | \delta y b | \epsilon C$$

$$B \Rightarrow \epsilon A d | \delta y c | \epsilon B | \epsilon$$

$$C \Rightarrow \epsilon B d | \epsilon C c | \epsilon B y | \epsilon$$

First	Follow
S   c, a, w, b, y	$\delta y$
B   a, b, c, y	w, c, a, y, d, $\delta$
B   c, a, $\epsilon$ , y	a, y, d, $\delta$ , c, a
C   z, w, a, b, $\epsilon$ , c, y	a, b, c

$$S \Rightarrow a B c | b c | B C d | a$$

$$B \Rightarrow \epsilon C | b c | \epsilon$$

$$C \Rightarrow a c | b c | D c | \epsilon$$

$$D \Rightarrow B C | c d | a c | C c$$