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## Prova II - Teoria

1) 1.1)

### Simplificação

$$G = (\{S, A, B, C\}, \{a, b, c, d\}, P, S)$$

$$P = S \rightarrow aSb \mid A$$

$$A \rightarrow bAc \mid d \mid B \quad B \text{ é inútil}$$

$$C \rightarrow cCd \mid \varepsilon \quad C \text{ inalcançável}$$

$$S \rightarrow aSb \mid A$$

$$A \rightarrow bAc \mid d$$

$$(S, A) : S \rightarrow A \text{ e } A \rightarrow bAc \mid d \therefore S \rightarrow bAc \mid d$$

$$S \rightarrow aSb \mid bAc \mid d$$

R:

$$G = (\{S, A\}, \{a, b, c, d\}, P, S)$$

$$P = S \rightarrow aSb \mid bAc \mid d$$

$$A \rightarrow bAc \mid d$$

1.2)

### Forma Normal de Chomsky

$$S \rightarrow aSb$$

$$S \rightarrow bAc$$

$$S \rightarrow d \quad \text{OK}$$

$$A \rightarrow bAc$$

$$A \rightarrow d \quad \text{OK}$$

$$1) S \rightarrow C_1 S b \quad 11) C_5 \rightarrow A C_6$$

$$2) C_1 \rightarrow a \quad 12) C_6 \rightarrow C$$

$$3) S \rightarrow C_1 C_2 \quad 13) A \rightarrow C_4 C_5$$

$$4) C_2 \rightarrow S b \quad 14) G = (\{S, A, C_1, C_2, C_3, C_4, C_5, C_6\},$$

$$5) C_2 \rightarrow S C_3 \quad \{a, b, c, d\}, P, S)$$

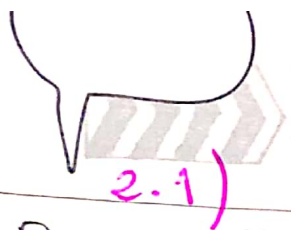
$$6) C_3 \rightarrow b \quad P = \{ S \rightarrow C_1 C_2 \mid C_4 C_5 \mid d, \\$$

$$7) S \rightarrow C_4 A c \quad C_1 \rightarrow a, C_2 \rightarrow S C_3, C_3 \rightarrow b, \\$$

$$8) C_4 \rightarrow b \quad C_4 \rightarrow b, C_5 \rightarrow A C_6, C_6 \rightarrow C, \\$$

$$9) S \rightarrow C_4 C_5 \quad A \rightarrow C_4 C_5 \mid d \}$$

$$10) C_5 \rightarrow A c$$



2)  $G = (\{E, T, F\}, \{+, *, (, ), id\}, P, E)$

$P =$   
 $E \rightarrow E + T \mid T$   
 $T \rightarrow T * F \mid F$   
 $F \rightarrow (E) \mid id$

$E \rightarrow E + T$

$E \rightarrow T$

$T \rightarrow T * F$

$T \rightarrow F$

$F \rightarrow (E)$

$F \rightarrow id$  OK

Simplificação

$E \rightarrow T$  e  $T \rightarrow T * F \mid F$

$\therefore E \rightarrow T * F \mid F$

$E \rightarrow F$  e  $F \rightarrow (E) \mid id$

$\therefore E \rightarrow (E) \mid id$

$\therefore T \rightarrow T * F \mid (E) \mid id$

$P =$   
 $\begin{cases} E \rightarrow E + T \mid T * F \mid (E) \mid id \\ T \rightarrow T * F \mid (E) \mid id \\ F \rightarrow (E) \mid id \end{cases}$

FNC

$E \rightarrow E + T$

$E \rightarrow (E)$

$E \rightarrow id$  OK

$T \rightarrow T * F$

$T \rightarrow (E)$

$T \rightarrow id$  OK

$F \rightarrow (E)$

$F \rightarrow id$  OK

2) etapa

$E \rightarrow E X_1$  ①

$X_1 \rightarrow + T$

$X_1 \rightarrow X_2 T$

$X_2 \rightarrow +$

$E \rightarrow X_3 E$

$X_3 \rightarrow ($

$E \rightarrow X_3 X_4$

$X_4 \rightarrow E)$

$X_4 \rightarrow E X_5$

$X_5 \rightarrow )$

$T \rightarrow X_3 X_4$

$$T \rightarrow T X_6$$

$$E \rightarrow T X_6$$

$$X_6 \rightarrow x F$$

$$X_6 \rightarrow X_7 F$$

$$X_7 \rightarrow x$$

$$F \rightarrow x_3 x_4$$

Gramática na FNC:

$$G_1 = (\{E, T, F, X_1, X_2, X_3, X_4, X_5, X_6, X_7\}, \{+, *, (, ), id\}, P, E\}$$

$$P = \left\{ \begin{array}{l} E \rightarrow E X_1 \mid X_3 X_4 \mid T X_6 \mid id \\ T \rightarrow T X_6 \mid X_3 X_4 \mid id \\ F \rightarrow X_3 X_4 \mid id \\ X_1 \rightarrow X_2 T \\ X_2 \rightarrow + \\ X_3 \rightarrow ( \\ X_4 \rightarrow E X_5 \\ X_5 \rightarrow ) \\ X_6 \rightarrow X_7 F \\ X_7 \rightarrow * \end{array} \right.$$

2.2) forma normal de greibach

$$P = \left\{ \begin{array}{l} E \rightarrow E + T \mid T * F \mid (E) \mid id \\ T \rightarrow T * F \mid (E) \mid id \\ F \rightarrow (E) \mid id \end{array} \right.$$

$$A \rightarrow a \alpha$$

$$E = A_1, T = A_2 \text{ e } F = A_3$$

$$E \rightarrow E + T$$

$$A_1 \rightarrow A_1 + A_2$$

$$E \rightarrow T * F$$

$$A_1 \rightarrow A_1 * A_3$$

$$E \rightarrow (E)$$

$$A_1 \rightarrow (A_1)$$

$$E \rightarrow id$$

$$A_1 \rightarrow id \quad \text{OK}$$

$$T \rightarrow T * F$$

$$A_2 \rightarrow A_2 * A_3$$

$$T \rightarrow (E)$$

$$A_2 \rightarrow (A_1)$$

$$T \rightarrow id$$

$$A_2 \rightarrow id \quad \text{OK}$$

$$F \rightarrow (E)$$

$$A_3 \rightarrow (A_1)$$

$$F \rightarrow id$$

$$A_3 \rightarrow id \quad \text{OK}$$





→ elim. nação da recursão à esquerda

$$\alpha = A_2$$

$$B_1 \rightarrow \alpha$$

$$B_1 \rightarrow \alpha + B_1$$

$$B_1 \rightarrow A_2 + B_1$$

$$\alpha = A_3$$

$$B_1 \rightarrow \alpha$$

$$B_1 \rightarrow \alpha * B_1$$

$$B_1 \rightarrow A_3 * B_1$$

$$\alpha = A_3$$

$$B_2 \rightarrow \alpha$$

$$B_2 \rightarrow \alpha * B_2$$

$$B_2 \rightarrow A_3 * B_2$$

$$B_1 \rightarrow A_2$$

$$B_1 \rightarrow A_2 + B_1$$

$$B_1 \rightarrow A_3$$

$$B_1 \rightarrow A_3 * B_1$$

$$B_2 \rightarrow A_3$$

$$B_2 \rightarrow A_3 * B_2$$

$$A_1 \rightarrow (A_1)$$

$$A_1 \rightarrow \text{id}$$

$$A_2 \rightarrow (A_1)$$

$$A_2 \rightarrow \text{id}$$

$$A_3 \rightarrow (A_1)$$

$$A_3 \rightarrow \text{id}$$

$$A_1 \rightarrow \text{id } B$$

$$A_2 \rightarrow \text{id } B$$

> casos especiais

# Forma Normal de Greibach

1)

$$B_1 \rightarrow A_2$$

$$B_1 \rightarrow A_2 + B_1$$

$$B_1 \rightarrow A_3$$

$$B_1 \rightarrow A_3 \times B_1 \rightarrow$$

$$B_2 \rightarrow A_3$$

$$B_2 \rightarrow A_3 * B_2$$

$$A_1 \rightarrow (X_1$$

$$A_2 \rightarrow (X_1$$

$$A_3 \rightarrow (X_1$$

$$X_1 \rightarrow A_1)$$

$$A_1 \rightarrow Id$$

$$A_2 \rightarrow Id$$

$$A_3 \rightarrow Id$$

casos  
espe  
ciais

$$A_1 \rightarrow Id B$$

$$A_2 \rightarrow Id B$$

3)

$$X_1 \rightarrow Id B X_5$$

$$X_5 \rightarrow )$$

$$G = \{ (B_1, B_2, X_1, X_2, X_3, X_4, X_5), (+, *, (, ), Id), P, B_1 \}$$

$$P = B_1 \rightarrow (X_1 \mid (X_1 X_2 \mid (X_1 X_3$$

$$B_2 \rightarrow (X_1 \mid (X_1 X_4 \mid$$

$$X_1 \rightarrow Id B X_5$$

$$X_2 \rightarrow + B_1$$

$$X_3 \rightarrow * B_1$$

$$X_4 \rightarrow * B_2$$

$$X_5 \rightarrow )$$

2)

$$B_1 \rightarrow (X_1$$

$$B_1 \rightarrow (X_1 X_2$$

$$X_2 \rightarrow + B_1$$

$$B_1 \rightarrow (X_1 X_3$$

$$X_3 \rightarrow * B_1$$

$$B_2 \rightarrow (X_1$$

$$B_2 \rightarrow (X_1 X_4$$

$$X_4 \rightarrow * B_2$$

$$X_1 \rightarrow A_1)$$

$$A_1 \rightarrow Id$$

$$A_1 \rightarrow Id B$$

3)

3.1

$$G = (\{Prop\}, \{\wedge, \vee, \rightarrow, (, ), p, q\}, P, p_{prop})$$

$$P = \{ Prop \rightarrow Prop \wedge Prop \mid Prop \vee Prop \mid$$

$$Prop \rightarrow Prop \mid ( Prop ) \mid p \mid q \}$$

1) Simplificação ok

2)  $Prop = A_1$

3)  $A_1 \rightarrow A_1 \wedge A_1 \mid A_1 \vee A_1 \mid A_1 \rightarrow A_1 \mid$

4)  $(A_1) \mid p \mid q \mid$  5)

$A_1 \rightarrow A_1 \wedge A_1$

$A_1 \rightarrow A_1 \vee A_1$

$A_1 \rightarrow A_1 \rightarrow A_1$

$A_1 \rightarrow (A_1)$

$A_1 \rightarrow p$

$A_1 \rightarrow q$

produções finais:

$A_1 \rightarrow p B_1 \mid q B_1 \mid p B_2 \mid q B_2$

$p B_3 \mid p B_4 \mid q B_4$

$B_1 \rightarrow \wedge A_1$

$B_2 \rightarrow \vee A_1$

$B_3 \rightarrow p B_5$

$B_3 \rightarrow q B_5$

$B_4 \rightarrow \rightarrow A_1$

$B_5 \rightarrow )$

$A_1 \rightarrow p B_1 \mid q B_1$

$B_1 \rightarrow \wedge A_1$

$A_1 \rightarrow q B_2 \times$

$B_2 \rightarrow \vee A_1$

$A_1 \rightarrow ( B_3 \times$

$B_3 \rightarrow A_1$

$B_4 \rightarrow \rightarrow A_1$

$A_1 \rightarrow p B_4 \times$

$A_1 \rightarrow q B_4 \times$

$B_3 \rightarrow p B_5$

$B_3 \rightarrow q B_5$

$B_5 \rightarrow )$





4)

Passo	1	D	futuro	0	Posição	1 → 2
	2	D	" "	0		2 → 3
	3	D	" "	0		3 → 4
	4	D	" "	0		4 → 5
	5	D	" "	0		5 → 6
	6	D	" "	0		6 → 7
	7	E	" "	1		7 → 6
	8	E	" "	1		6 → 5
	9	E	" "	1		5 → 4
	10	E	" "	1		4 → 3
	11	E	" "	1		3 → 2
	12	E	" "	1		2 → 1
	13	D	" "	Parada		1 → 2

alternativa e)