

Lista de Exercícios:  
Linguagens Livres de Contexto e GLC

Linguagens Formais e Compiladores  
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1. Elimine os símbolos inúteis das seguintes gramáticas livre de contexto:

$$\begin{array}{ll}
 S ::= aSa \mid FbD \mid BE & S ::= aASbC \mid BeD \mid BE \\
 A ::= aA \mid CA \mid \varepsilon & A ::= aAbC \mid CD \mid \varepsilon \\
 B ::= bB \mid FE & B ::= bB \mid aAc \\
 C ::= cCb \mid AcA & C ::= bCb \mid AcA \\
 D ::= Dd \mid fF \mid c & D ::= dD \mid eF \mid c \\
 E ::= BC \mid eE \mid EB & E ::= eFc \mid eE \mid FB \\
 F ::= fF \mid Dd & F ::= EF \mid dD
 \end{array}$$

2. Transforme em  $\varepsilon$ -**Livre** e elimine as **produções unitárias** das seguintes GLC:

$$\begin{array}{ll}
 a) \quad S ::= AB \mid aS & b) \quad P ::= KL \mid bKLe \\
 A ::= bA \mid BC & K ::= cK \mid TV \\
 B ::= dB \mid C \mid \varepsilon & T ::= tT \mid \varepsilon \\
 C ::= cCc \mid BD & V ::= vV \mid \varepsilon \\
 D ::= CD \mid d \mid \varepsilon & L ::= LC \mid C \\
 & C ::= P \mid com \mid \varepsilon
 \end{array}$$

3. Elimine as **recursões à esquerda** das seguintes GLC:

$$\begin{array}{ll}
 a) \quad E ::= E + T \mid E - T \mid T & b) \quad S ::= Bd \mid \varepsilon \\
 T ::= T * F \mid F \mid T/F & B ::= Ab \mid Bc \\
 F ::= F * * P \mid P & A ::= Sa \mid \varepsilon \\
 P ::= (E) \mid id \mid cte &
 \end{array}$$

4. Elimine o não determinismo das seguintes GLC:

$$\begin{array}{lll}
 a) \quad S ::= bcD \mid Bcd & b) \quad P ::= DL \mid L & c) \quad V ::= id[E] \mid id \\
 B ::= bB \mid b & D ::= dD \mid \varepsilon & C ::= V = exp \mid id(E) \\
 D ::= dD \mid d & L ::= L; C \mid C & E ::= exp, E \mid exp \\
 & C ::= cmd; \mid \varepsilon &
 \end{array}$$