

UNIVERSIDADE FEDERAL DE RORAIMA
DISCIPLINA CONSTRUÇÃO DE COMPILADORES
PROF.: DR. LUCIANO FERREIRA
ALUNO: FELIPE DERKIAN DE SOUSA FREITAS

LISTA 2

BOA VISTA, 19 DE SETEMBRO DE 2020

Compiladores - lista 2 - Felipe Werhane

2.1 a) $C_1 = \{x \mid x \in \mathbb{N} \wedge x < 7\}$

$$C_1 = \{0, 1, 2, 3, 4, 5, 6\}$$

b) $C_2 = \{x \mid x \in \mathbb{N} \wedge 3 < x < 10\}$

$$C_2 = \{4, 5, 6, 7, 8, 9\}$$

c) $C_3 = C_1 \cup C_2$

$$C_3 = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

d) $C_4 = C_1 \cap C_2$

$$C_4 = \{4, 5, 6\}$$

e) $C_5 = C_1 - C_2$

$$C_5 = \{0, 1, 2, 3\}$$

f) $C_6 = C_2 - C_1$

$$C_6 = \{7, 8, 9\}$$

g) $C_7 = \{x \mid x \neq x\}$

$$C_7 = \{\emptyset\}$$

h) $C_8 = (C_1 \cup C_2) - (C_1 \cap C_2)$

$$C_8 = C_3 - C_4$$

$$C_8 = \{0, 1, 2, 3, 7, 8, 9\}$$

2.2 $A = \{a, b, c, d\}$ Verdadero ou falso?

a) $a \in A \vdash R$: Verdadero

b) $\{a\} \in A \vdash R$: Falso.

c) $a \subset A \vdash R$: Falso

d) $\{a\} \subset A \vdash R$: Verdadero

(2.3)

(2.4) $B = \{0,1\}$

a) $\{0^m 1^n 0^m \mid m \geq 0 \wedge n \geq 0\}$

$B^+ = \{1, 11, 010, 00100, 1111, 000010000, \dots\}$

b) $\{1^n 0^{2n} \mid n \geq 0\}$

$B^+ = \{100, 110000, 111000000, \dots\}$

c) $\{(01)^n 0^m \mid n \geq 0\}$

$B^+ = \{010, 010100, 010101000, \dots\}$

(2.5) a)

b) $z \rightarrow 1200$

$G = \{[0], [2], \{z \rightarrow 1200\}, z\}$

c) $z \rightarrow 0120$

~~G~~ $G = \{[0], [2], \{z \rightarrow 0120\}, z\}$

Helps Review

2.6 a) 0002111

$z \rightarrow \epsilon$, $z \rightarrow 021$, $z \rightarrow 00211$, $z \rightarrow 0002111$ \neq

b) 01

$z \rightarrow \epsilon$, $z \rightarrow 021$, 01 \neq

c) 00001111

$z \rightarrow \epsilon$, $z \rightarrow 021$, $z \rightarrow 00211$, $z \rightarrow 0002111$, $z \rightarrow 000021111$, 00001111 \neq

2.7 $G = (\{a\}, \{S, N, Q, R\}, P, S)$

a) Qual é a classificação de G pela hierarquia de Chomsky?

Gramática tipo 3, gramática regular.

$S \rightarrow QNQ$

$QN \rightarrow QR$

$RN \rightarrow NNR$

$RQ \rightarrow NNR$

b) Dê quatro exemplos de sentenças que podem ser derivadas a partir do símbolo sentencial S .

$N \rightarrow a$

$Q \rightarrow \epsilon$

① $S \rightarrow QPNQ$ \times

③ $S \rightarrow QNR$

$QN \rightarrow QRQ$

② $S \rightarrow QNQ$

$QN \rightarrow QRQ$ \times

$RQ \rightarrow QNNQ$ \times

④ $S \rightarrow QNQ$

$QN \rightarrow QRQ$

$RQ \rightarrow QNNQ$

$N \rightarrow aaaa$ \times

(2.3) a) $C_1 = \{1, 2, 3\}$

$$\{\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$$

Logo $\mathcal{P}(C_1) = \{\{\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$

b) $\{1\}, \{2\}, \{3\}$

Partição com 1 elemento.

(2.10) $ba | a^* b$

$$ba, b, ab, aab, \dots$$

$$S \rightarrow ab$$

$$a \rightarrow ba a$$

$$a \rightarrow a a$$

$$a \rightarrow \epsilon$$

$$(\{b\}, \{S, a\}, \{S \rightarrow ab, a \rightarrow ba a, a \rightarrow a a, a \rightarrow \epsilon\}, S)$$

(2.8) $(aa)^*$

$\epsilon, aa, aaaa, aaaaaa, \dots$

$S \rightarrow \epsilon$
 $S \rightarrow aaS$

$(\{\epsilon, a\}, \{S\}, \{S \rightarrow aaS, S \rightarrow \epsilon\}, S)$

(2.9) $a(b|c)^*$

a, ab, ac, abc, \dots

$S \rightarrow aA$
 $A \rightarrow bA$
 $A \rightarrow cA$
 $A \rightarrow \epsilon$

$(\{a, b, c\}, \{S, A\}, \{S \rightarrow aA, A \rightarrow bA, A \rightarrow cA, A \rightarrow \epsilon\}, S)$

(2.11) $x^*(y|z)z^*$

xyy, yyz, y

$S \rightarrow APG$
 $P \rightarrow yP$
 $P \rightarrow Pz$
 $A \rightarrow xA$
 $A \rightarrow \epsilon$
 $G \rightarrow Gz$
 $G \rightarrow \epsilon$

$(\{y, z\}, \{S, A, P, G\}, \{P, S\})$

2.13 $G = (\{a, b\}, \{S, A\}, \{S \rightarrow A, A \rightarrow aAb, A \rightarrow ab\}, S)$

$$S \rightarrow A$$

$$aAb$$

$$aabb$$

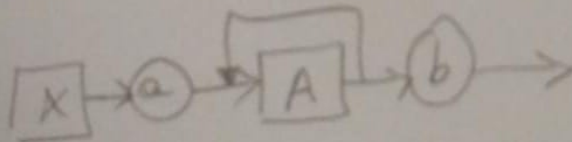
$$A \rightarrow aAb$$

$$A \rightarrow ab$$

a) Gramática regular Tipo 3.

b) $\langle X \rangle ::= a \langle A \rangle b$

c)



d)

$$S \rightarrow A$$

$$A \rightarrow aAb$$

$$A \rightarrow ab$$

lenguaje: aAb
 $aabb$

2.14) $G = (\{x, y, z\}, \{S, A, B, C\}, \{S \rightarrow AxByC, A \rightarrow xAx, A \rightarrow \epsilon, B \rightarrow By, B \rightarrow \epsilon, C \rightarrow zAz\}, S)$

$S \rightarrow AxByC$

$A \rightarrow xAx$

$A \rightarrow \epsilon$

$B \rightarrow By$

$B \rightarrow \epsilon$

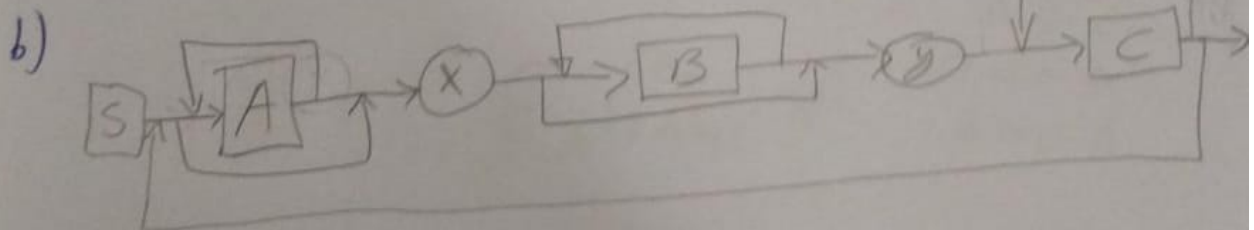
$C \rightarrow zAz$

a) $\langle S \rangle ::= \langle A \rangle x \langle B \rangle y \langle C \rangle$

$\langle A \rangle ::= [x \langle A \rangle x]$

$\langle B \rangle ::= [\langle B \rangle y]$

$\langle C \rangle ::= [z \langle A \rangle z]$



c) $xxxxyyzzxxz$

$B \rightarrow xxxxyyC$

$S \rightarrow AxByC$

$C \rightarrow xxxxyy zAz$

$A \rightarrow xAx$

$A \rightarrow xxxxyy zxAxz$

$A \rightarrow xxxByC$

$A \rightarrow xxxxyy zxxz$

$B \rightarrow xxxByyC$

2.15 $G = (\{x, y, +, \cdot, (,)\}, \{E\}, P, E)$

$$E \rightarrow E + E$$

$$E \rightarrow E \times E$$

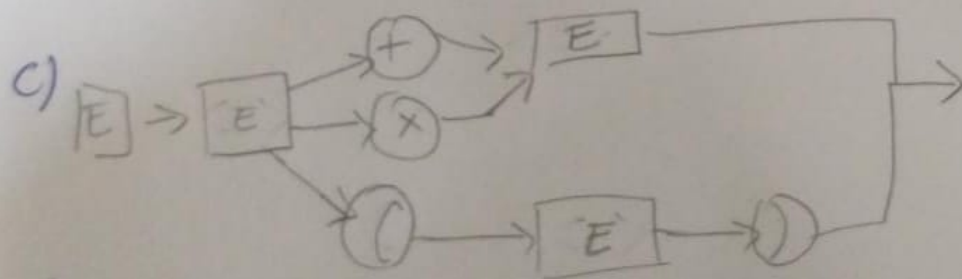
$$E \rightarrow (E)$$

$$E \rightarrow x$$

$$E \rightarrow y$$

a) Gramática do tipo 3 ou sensível ao contexto por conta das expressões de precedência das operações.

$$b) \langle E \rangle ::= \langle E \rangle + \langle E \rangle \mid \langle E \rangle \times \langle E \rangle \mid (\langle E \rangle) \mid x \mid y$$



d) $x + x \times y$

$$E \rightarrow E + E$$

$$E \rightarrow E + E \times E$$

$$E \rightarrow x + x \times E$$

$$E \rightarrow x + x \times y$$

(2.17)

$$S \rightarrow aSz$$

$$T \rightarrow bT$$

$$U \rightarrow UX$$

$$S \rightarrow TV$$

$$T \rightarrow X$$

$$U \rightarrow b$$

a) $\{z\}, \{S, T, U\}, R, S$

b)

$$aXbz, abXbz, aXXbbz, \dots$$

$$S \rightarrow aSz$$

$$S \rightarrow aTVz$$

$$T \rightarrow aXUz$$

$$U \rightarrow aXbz$$

$$S \rightarrow aSz$$

$$S \rightarrow aTVz$$

$$S \rightarrow abTVz$$

$$T \rightarrow abXUz$$

$$U \rightarrow abXbz$$

$$S \rightarrow aSz$$

$$S \rightarrow aTVz$$

$$S \rightarrow aTTUz$$

$$T \rightarrow aXXUUz$$

$$U \rightarrow aXXbbz$$