

$$2) S \rightarrow AB \mid C$$

$$A \rightarrow aAb \mid \epsilon \quad (1) \quad E = \{\epsilon\}$$

$$B \rightarrow cBd \mid AD \quad Q = \{A, D\}$$

$$C \rightarrow aCd \mid BSD$$

$$D \rightarrow bDc \mid \epsilon$$

$$(2) \quad E = \{\epsilon, A, D\}$$

$$Q = \{B\}$$

$$(3) \quad E = \{\epsilon, A, D, B\}$$

$$Q = \{S\}$$

$$(4) \quad E = \{\epsilon, A, D, B, S\}$$

$$Q = \{C\}$$

// Não existem mais símbolos a marcar

$$\text{Anuláveis} \rightarrow E = \{\epsilon, A, B, C, D, S\}$$

// retirando os anuláveis

$$S \rightarrow AB \mid A \mid B \mid C$$

$$A \rightarrow aAb \mid ab$$

$$B \rightarrow cBd \mid cd \mid AD \mid A \mid D \mid \epsilon$$

$$C \rightarrow aCd \mid abd \mid BSD \mid S \mid D \mid A \mid B \mid \epsilon$$

$$D \rightarrow bDc \mid bc$$

// retirando produções unitárias

$$S \rightarrow S \mid \epsilon$$

$$S \rightarrow AB \mid A \mid B \mid \epsilon$$

$$A \rightarrow aAb \mid ab$$

$$B \rightarrow cBd \mid cd \mid AD \mid A \mid D$$

$$C \rightarrow aCd \mid ad \mid BSD \mid SD \mid BD \mid BS$$

$$D \rightarrow bDc \mid bc$$

$$S \rightarrow \{AB\} \{aAb \mid ab\} \{cBd \mid cd \mid AD\} \{bDc \mid bc\} \{aCd \mid ad \mid BSD \mid SD \mid BD \mid BS\} \mid \epsilon$$

$$S \rightarrow AB \{aAb \mid ab\} \{cBd \mid cd \mid AD\} \{bDc \mid bc\} \{aCd \mid ad \mid BSD \mid BS \mid BD \mid SD\}$$

$$A \rightarrow aAb \mid ab$$

$$B \rightarrow cBd \mid cd \mid AD \{aAb \mid ab\} \{bDc \mid bc\}$$

$$C \rightarrow aCd \mid ad \mid BSD \mid SD \mid BD \mid BS$$

$$D \rightarrow bDc \mid bc$$

$$S \rightarrow AB \mid aAb \mid ab \mid cBd \mid cd \mid AD \mid bDc \mid bc \mid aCd \mid ad \mid BSD \mid BS \mid BD \mid SD \mid \epsilon$$

$$S \rightarrow AB \mid aAb \mid ab \mid cBd \mid cd \mid AD \mid bDc \mid bc \mid aCd \mid ad \mid BSD \mid BS \mid BD \mid SD$$

$$A \rightarrow aAb \mid ab$$

$$B \rightarrow cBd \mid cd \mid AD \mid aAb \mid ab \mid bDc \mid bc$$

$$C \rightarrow aCd \mid ad \mid BSD \mid SD \mid BD \mid BS$$

$$D \rightarrow bDc \mid bc$$