

COSC 312
02/27/22

Sneha M
①

1. $V = \{A, B\}$, $\Sigma = \{0, 1\}$, $S = A$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow BAB \mid B \mid 1 \mid \epsilon \\ B &\rightarrow 00 \mid \epsilon \end{aligned}$$

2a) $V = \{S, A, B, C\}$, $\Sigma = \{a, b, c\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow AaB \mid Aa \\ B &\rightarrow b \mid C \\ C &\rightarrow CC \mid c \mid \epsilon \end{aligned} \quad \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{aligned} S &\rightarrow A \\ A &\rightarrow AaB \mid Aa \\ B &\rightarrow b \mid C \mid \epsilon \\ C &\rightarrow CC \mid c \end{aligned}$$

b) $V = \{S, A, B\}$, $\Sigma = \{a, b\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow AA \mid AB \mid B \mid a \mid A \mid \epsilon \\ B &\rightarrow BB \mid b \mid B \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{aligned} S &\rightarrow A \mid \epsilon \\ A &\rightarrow AA \mid AB \mid A \mid B \mid aB \\ B &\rightarrow BB \mid Bb \mid b \end{aligned}$$

3a) $V = \{S, A, B\}$, $\Sigma = \{a, b\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow AA \mid AB \mid B \mid aB \\ B &\rightarrow BB \mid Bb \mid b \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{aligned} S &\rightarrow A \\ A &\rightarrow AA \mid AB \mid aB \mid BB \mid Bb \mid b \\ B &\rightarrow BB \mid Bb \mid b \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

$$\begin{aligned} S &\rightarrow AA \mid AB \mid aB \mid BB \mid Bb \mid b \\ A &\rightarrow AA \mid AB \mid aB \mid BB \mid Bb \mid b \\ B &\rightarrow BB \mid Bb \mid b \end{aligned}$$

b) $V = \{S, A, B, C, D\}$, $\Sigma = \{a, b, c\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow BC \mid \epsilon \\ B &\rightarrow BD \mid bb \\ C &\rightarrow CD \mid CC \\ D &\rightarrow BD \mid bb \mid CD \mid CC \end{aligned}$$

4. $V = \{S, A, B\}$, $\Sigma = \{a, b\}$, $S = S$, $R =$

S → AA | ZY | AB | A*

$$A \rightarrow AA \mid ZY \mid AB \mid Ax$$

B → BB | Y | b

$$Z \rightarrow a$$
$$Y \rightarrow Bx$$
$$X \rightarrow 0$$

5. $V = \{A, B, C, D\}$ $\Sigma = \{x, \sqrt{\quad}, +, (,)\} \cup \{\epsilon\}$, $S = A$, $R =$

$$A \rightarrow B | C | x$$
$$B \rightarrow \neg C \vee \neg A$$
$$C \rightarrow (D) \mid (A)$$
$$D \rightarrow A + A$$
