

6. Przekształcenia gramatyk bezkontekstowych – zadania

Poniższe gramatyki doprowadzić do postaci prawidłowej:

6.1.

$$\begin{aligned} S &\rightarrow aAA / B \\ A &\rightarrow b / \varepsilon \\ B &\rightarrow BAA / S \end{aligned}$$

6.2.

$$\begin{aligned} S &\rightarrow bBB / A \\ A &\rightarrow S / a \\ B &\rightarrow AB / \varepsilon \end{aligned}$$

6.3.

$$\begin{aligned} S &\rightarrow ABS / B \\ A &\rightarrow aA / BB / \varepsilon \\ B &\rightarrow Bab / A \end{aligned}$$

6.4.

$$\begin{aligned} S &\rightarrow aBB / SAb \\ A &\rightarrow B / AA / a \\ B &\rightarrow A / \varepsilon \end{aligned}$$

6.5.

$$\begin{aligned} S &\rightarrow ab / SS / AB / \varepsilon \\ A &\rightarrow B / Sa \\ B &\rightarrow A / Sb \end{aligned}$$

6.6.

$$\begin{aligned} S &\rightarrow AB / BA / SS \\ A &\rightarrow B / \varepsilon \\ B &\rightarrow A / \varepsilon \end{aligned}$$

6.7.

$$\begin{aligned} S &\rightarrow AaBb / ab \\ A &\rightarrow Sb / \varepsilon \\ B &\rightarrow Sa / \varepsilon \end{aligned}$$

6.8.

$$\begin{aligned} S &\rightarrow aAbB / AB \\ A &\rightarrow B / Sa \\ B &\rightarrow AB / \varepsilon \end{aligned}$$

Usunąć lewostronną rekursję w poniższych gramatykach:

6.9.

$$\begin{aligned} S &\rightarrow SAB \mid Ab \mid Ba \\ A &\rightarrow Bba \mid a \\ B &\rightarrow Aab \mid b \end{aligned}$$

6.10.

$$\begin{aligned} S &\rightarrow SBA \mid Ba \mid Ab \\ A &\rightarrow Sba \mid b \\ B &\rightarrow Sab \mid a \end{aligned}$$

6.11.

$$\begin{aligned} S &\rightarrow Saa \mid AB \mid BA \\ A &\rightarrow Ba \mid b \\ B &\rightarrow Ab \mid a \end{aligned}$$

6.12.

$$\begin{aligned} S &\rightarrow AAa \mid BBb \mid SS \\ A &\rightarrow SA \mid a \\ B &\rightarrow SB \mid b \end{aligned}$$

6.13.

$$\begin{aligned} S &\rightarrow ASa \mid BSb \mid ba \\ A &\rightarrow BaA \mid b \\ B &\rightarrow a \mid Bb \mid Ab \end{aligned}$$

6.14.

$$\begin{aligned} S &\rightarrow ABa \mid BaB \\ A &\rightarrow SaA \mid b \\ B &\rightarrow SbB \mid a \end{aligned}$$

6.15.

$$\begin{aligned} S &\rightarrow A \mid B \mid SabS \\ A &\rightarrow AA \mid b \\ B &\rightarrow BB \mid a \end{aligned}$$

Poniższe gramatyki bezkontekstowe przekształcić do postaci normalnej Chomsky'ego.

6.16.

$$\begin{aligned} S &\rightarrow aAb \mid aSa \\ A &\rightarrow bAc \mid ab \end{aligned}$$

6.17.

$$\begin{aligned} S &\rightarrow aaSb \mid bAa \\ A &\rightarrow aAbb \mid a \end{aligned}$$

Poniższe gramatyki bezkontekstowe przekształcić do postaci normalnej Greibach.

6.18.

$$S \rightarrow AB \mid BS$$

$$A \rightarrow BA \mid a$$

$$B \rightarrow AS \mid b$$

6.19.

$$S \rightarrow SA \mid b$$

$$A \rightarrow BA \mid a$$

$$B \rightarrow SB \mid AB$$

Usunąć lewostronną rekurencję w poniższej gramatyce bezkontekstowej:

6.20.

$$S \rightarrow SAB \mid Ab \mid Ba$$

$$A \rightarrow Sbb \mid a \mid \varepsilon$$

$$B \rightarrow Saa \mid b$$

6.21.

$$S \rightarrow SBA \mid Ba \mid Ab$$

$$A \rightarrow Sba \mid b$$

$$B \rightarrow Sab \mid a \mid \varepsilon$$

6.22.

$$S \rightarrow Saa \mid AbA \mid BaB$$

$$A \rightarrow Sa \mid b \mid \varepsilon$$

$$B \rightarrow Sb \mid a$$

6.23.

$$S \rightarrow AAa \mid BBb \mid SS$$

$$A \rightarrow Sa \mid a$$

$$B \rightarrow Sb \mid b \mid \varepsilon$$

Następującą gramatykę bezkontekstową doprowadzić do postaci prawidłowej.

6.24.

$$S \rightarrow BAB \mid aS \mid Sb \mid CC$$

$$A \rightarrow \varepsilon \mid BB \mid abS \mid ba$$

$$B \rightarrow aa \mid bbS \mid AA$$

$$C \rightarrow Cab \mid baC$$

$$D \rightarrow cC \mid dd \mid c \mid cDd \mid dDc$$

6.25

$S \rightarrow ABA \mid bS \mid Sa \mid DD$
 $A \rightarrow BB \mid Sab \mid ba$
 $B \rightarrow \varepsilon \mid Saa \mid bb \mid AA$
 $C \rightarrow d \mid cc \mid cDC \mid Cdc \mid Dd$
 $D \rightarrow aDb \mid bDa$

6.26.

$S \rightarrow BAB \mid aS \mid Sb \mid CC$
 $A \rightarrow \varepsilon \mid BB \mid abS \mid ba$
 $B \rightarrow aa \mid bbS \mid AA$
 $C \rightarrow Cab \mid baC$
 $D \rightarrow cC \mid dd \mid c \mid cDd \mid dDc$

6.27.

$S \rightarrow ABA \mid bS \mid Sa \mid DD$
 $A \rightarrow BB \mid Sab \mid ba$
 $B \rightarrow \varepsilon \mid Saa \mid bb \mid AA$
 $C \rightarrow d \mid cc \mid cDC \mid Cdc \mid Dd$
 $D \rightarrow aDb \mid bDa$