

sec 6.1

9. Eliminate all
- λ
- productions from

$$S \rightarrow AaB \mid aaB$$

$$A \rightarrow \lambda$$

$$B \rightarrow bbA \mid \lambda$$



$$S \rightarrow A \mid AB$$

$$A \rightarrow a \mid aa$$

$$B \rightarrow bb$$

11. Eliminate all unit productions from the grammar in Exercise 7.

$$S \rightarrow a \mid aA \mid B \mid C$$

$$A \rightarrow aB \mid \lambda$$

$$B \rightarrow aA$$

$$C \rightarrow cCD$$

$$D \rightarrow ddd \mid Cd$$



$$S \rightarrow A \mid C$$

$$A \rightarrow aaA \mid a$$

$$C \rightarrow cCD$$

$$D \rightarrow ddd \mid Cd$$

* Production Rule C is an infinite loop.

sec 6.2

4. Transform the grammar into Chomsky normal form.

$$S \rightarrow baAB$$

$$A \rightarrow bAB \mid \lambda$$

$$B \rightarrow BAa \mid A \mid \lambda$$



$$T_a \rightarrow a, T_b \rightarrow b$$

$$V_1 \rightarrow T_b T_a, V_2 \rightarrow AB$$

$$V_3 \rightarrow BA$$

$$S \rightarrow V_1 \mid V_1 V_2$$

$$A \rightarrow T_b V_2 \mid V_1 \mid T_b$$

$$B \rightarrow V_3 T_a \mid T_a$$

$$V_1 \rightarrow T_b T_a$$

$$V_2 \rightarrow AB$$

$$V_3 \rightarrow BA$$

$$T_a \rightarrow a$$

$$T_b \rightarrow b$$