

Homework Module #10

Sec 5.1: 9b, 12b, 22

Sec 5.2: 20

* show grammar in example 5.5 is ambiguous.

Sec 5.1

9. Find context-free grammars for the following languages (with $n \geq 0$ and $m \geq 0$):

b) $L = \{a^n b^m : n = m - 1\}$ * $0 = (1) - 1$, thus $n \geq 0$
 $m \geq 1$

Production Rules (P)

$$S \rightarrow Ab$$

$$A \rightarrow aAb \mid \lambda$$

$G = ($

$$G = (\{S, A\}, \{a, b\}, P, S)$$

12. Find context-free grammars for the following languages (with $n \geq 0$, $m \geq 0$, $k \geq 0$):

b) $L = \{a^n b^m c^k : n = m \text{ or } m \neq k\}$

Production Rules (P)

* $n = m$

$$S \rightarrow asb \mid A$$

$$A \rightarrow cA \mid \lambda$$

Production Rules (P)

* $m \neq k$

$$S \rightarrow AB$$

$$A \rightarrow aA \mid \lambda$$

$$B \rightarrow bBc \mid b \mid c$$

\Rightarrow

Production Rule (P)

* $n = m \text{ OR } m \neq k$

$$S \rightarrow x \mid AB$$

$$x \rightarrow axb \mid Y$$

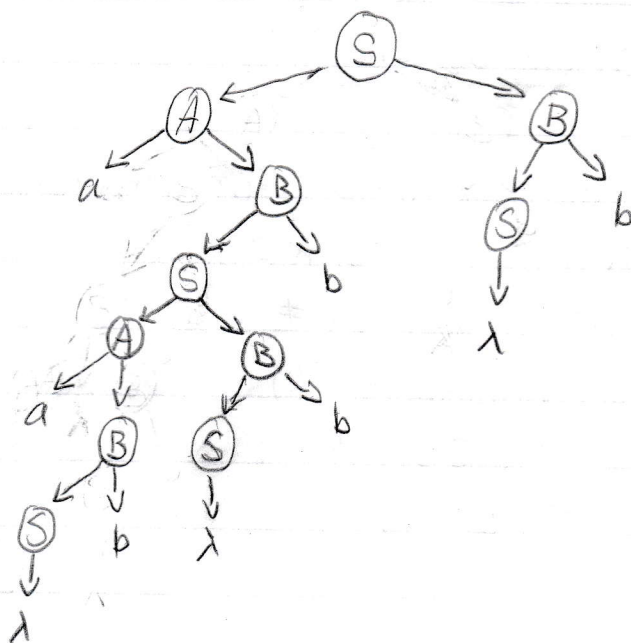
$$Y \rightarrow cY \mid \lambda$$

$$A \rightarrow aA \mid \lambda$$

$$B \rightarrow bBc \mid b \mid c$$

12. b) $G = (\{S, A, B, X, Y\}, \{a, b, c\}, S, P)$

22. Show a derivation tree for the string aabbbb with the grammar

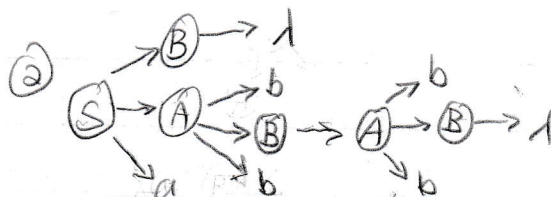
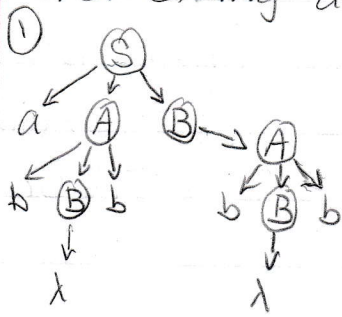
$$S \rightarrow \overset{0}{A}B \mid \lambda \quad A \rightarrow aB \quad B \rightarrow Sb$$
$$\begin{aligned} * S &\Rightarrow AB \Rightarrow aBB \Rightarrow asbB \Rightarrow aABbB \\ &\Rightarrow aaBBbB \Rightarrow aaSbBbB \Rightarrow aa(1)bBbB \\ &\Rightarrow aabSbbB \Rightarrow aa(1)bbB \Rightarrow aabbbSb \\ &\Rightarrow aabbbb(1)b \Rightarrow aabbbb \end{aligned}$$


Sec 5.2

20. Show that the grammar in Example 5.5 is ambiguous.

* EX 5.5 $S \rightarrow aAB$ $A \rightarrow bBb$ $B \rightarrow A|a$

* For string abbbb



2 distinct parse trees, grammar is ambiguous.