

HW-06

4.11:

a. $2l - 1$

b. 1

4.14:

$S \rightarrow AA \mid 0$

$A \rightarrow SS \mid 1$

Step 1:

$S \rightarrow AA \mid 0$

$A \rightarrow AAS \mid 0S \mid 1$

Step 2:

$S \rightarrow AA \mid 0$

$A \rightarrow 0SB \mid 1B \mid 0S \mid 1$

$B \rightarrow AS \mid ASB$

Step 3:

$S \rightarrow 0SBA \mid 1BA \mid 0SA \mid 1A \mid 0$

$A \rightarrow 0SB \mid 1B \mid 0S \mid 1$

$B \rightarrow AS \mid ASB$

Step 4:

$S \rightarrow 0SBA \mid 1BA \mid 0SA \mid 1A \mid 0$

$A \rightarrow 0SB \mid 1B \mid 0S \mid 1$

$B \rightarrow 0SBS \mid 1BS \mid 0SS \mid 1S \mid 0SBSB \mid 1BSB \mid 0SSB \mid 1SB$

4.18:

No. If all the productions are of the form $A \rightarrow BCD$, $A \rightarrow a$, then it is impossible to generate string of length 2. Consider the Language $L = \{a^n b^n \mid n \geq 1\}$, that cannot be generated by a CFG all of whose productions are of the form $A \rightarrow BCD$, $A \rightarrow a$.