

HW#7

2.3

$$R \rightarrow XRX / S$$

$$S \rightarrow aTb / bTa$$

$$T \rightarrow xTx / x / \epsilon$$

$$x \rightarrow a / b$$

(a) R, X, S, T

(i) True

(b) a, b

(j) True

(c) R

(k) False

(d) ab, ba, aab

(l) True

(e) a, b, ϵ

(m) True

(f) False

(n) False

(g) True

(o) $L(a)$ start and with different symbols which consisting of all symbols in between that are not palindromes.

(h) False

2.4

(a) $S \rightarrow R_1 R_1 R_1 R$

$$R \rightarrow 0R / 1R / \epsilon$$

(b) $S \rightarrow 0T0 / 1T1$

$$T \rightarrow 0T / 1T / \epsilon$$

$$(c) \quad S \longrightarrow 0T \mid 1T$$

$$T \longrightarrow 0S \mid 1S \mid \epsilon$$

$$(d) \quad S \longrightarrow 0 \mid 0S0 \mid 0S1 \mid 1S0 \mid 1S1$$

$$(e) \quad S \longrightarrow 0 \mid 1 \mid 0S0 \mid 1S1 \mid \epsilon$$

$$(f) \quad S \longrightarrow S$$

- Give a CFG for the language: $\{x \in \{a, b\}^* \mid x \neq ww \text{ for some } w \in \{a, b\}^+\}$

$$S \longrightarrow T \mid R \mid TR \mid RT$$

$$T \longrightarrow 0 \mid 1T1 \mid 0T0 \mid 1T0 \mid 0T1$$

$$R \longrightarrow 1 \mid 1R1 \mid 0R0 \mid 1R0 \mid 0R1$$