AFL: Assignment 5

Due on December 3, 2018 at 11:55pm

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Problem 1

We want to write the CFGs corresponding to the following languages:

L1 $= \{w = 0^i 1^k | i = k + 2;\ i, k > 0\} \equiv$ L1 $= \{w = 0^{k+2} i^k | i, k > 0\}$:
$S \mapsto 0S1 \mid 0001$

L2 $= \{w | w$ is a palindrome and has at least two 0s and two 1s$\}$:
$S \mapsto 1A1 \mid 0B0$
$A \mapsto 1A1 \mid 0C0$
$B \mapsto 0B0 \mid 1C1$
$C \mapsto 0C0 \mid 1C1 \mid 0 \mid 1 \mid \epsilon$

L3 $= \{w | w$ starts and ends with the same symbol and has an odd number of 0s$\}$:
$S \mapsto 1A1 \mid 0A0 \mid 0$
$A \mapsto 1A \mid 0B \mid 0$
$B \mapsto 1B \mid 0A \mid 1$

L4 $= \{w | w$ has odd length and the middle symbol in w is a 0 and w has an even number of 0s$\}$
$S \mapsto 0S0 \mid 1S1 \mid 0O1 \mid 1O0$
$O \mapsto 0O0 \mid 1O1 \mid 0S1 \mid 1S0 \mid 0$

L5 $= \{a^i b^j c^k | i \neq j \vee j \neq k, \quad i, j, k \geq 0\}$
$S \mapsto S_1 \mid S_2$
$S_1 \mapsto KC$
$S_2 \mapsto AQ$
$K \mapsto aKb \mid aA \mid bB$
$Q \mapsto bQc \mid bB \mid cC$
$A \mapsto aA \mid \epsilon$
$B \mapsto bB \mid \epsilon$
$C \mapsto cC \mid \epsilon$

Find the regular expression for the following language:

L6 $= \{w | w$ every 1 is followed by at least a 0$\}$, $\quad \Sigma = \{0, 1, 2\}$

$$(10(0 \cup 2)^*)^* (0 \cup 2)^*$$

$$(0 \cup 2 \cup 10)^*$$