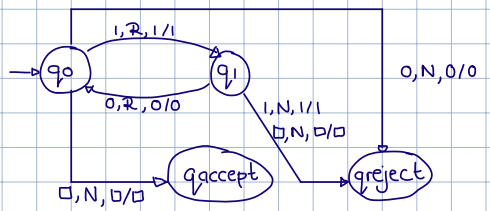
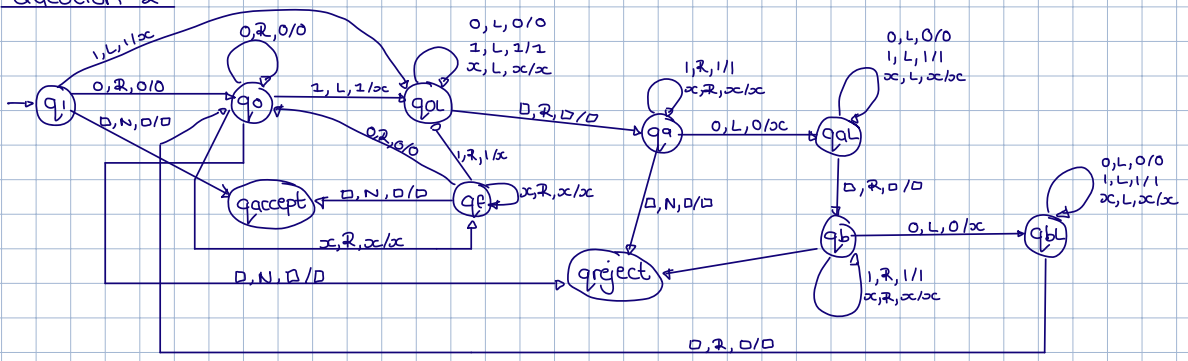
COS 210 Worksheet 10 Dylan Kapnias (u18108467)

Question 1



$M = (Q, \Sigma, \Gamma, \delta, q_0, q_{accept}, q_{reject})$
$Q = (q_0, q_1, q_{accept}, q_{reject})$
$\Sigma = (0, 1)$
$\Gamma = \Sigma \cup \square$
$\delta = \{ q_0 1 \to q_1 1 R$
$q_0 \square \to q_{accept} \square N$
$q_0 0 \to q_{reject} 0 N$
$q_1 0 \to q_0 0 R$
$q_1 1 \to q_{reject} 1 N$
$q_1 \square \to q_{reject} \square N \}$

Question 2



$M = (Q, \Sigma, \Gamma, \delta, q_1, q_{accept}, q_{reject})$
$Q = (q_0, q_{0L}, q_9, q_{9L}, q_b, q_{bL}, q_f, q_{accept}, q_{reject})$
$\Sigma = (0, 1, x)$
$\Gamma = \Sigma \cup \square$
$\delta = \{ q_1 0 \to q_0 0 R$
$q_1 1 \to q_{0L} x L$
$q_1 \square \to q_{accept} \square N$

$q_0 0 \to q_0 0 R$
$q_0 1 \to q_{0L} x L$
$q_0 x \to q_f x R$
$q_0 \square \to q_{reject} \square N$

$q_{0L} 0 \to q_{0L} 0 L$
$q_{0L} 1 \to q_{0L} 1 L$
$q_{0L} x \to q_{0L} x L$

$q_0 L \square \rightarrow q_q \square R$

$q_q 0 \rightarrow q_{qL} x L$
$q_q 1 \rightarrow q_q 1 R$
$q_q x \rightarrow q_q x R$
$q_q \square \rightarrow q_{reject} \square N$

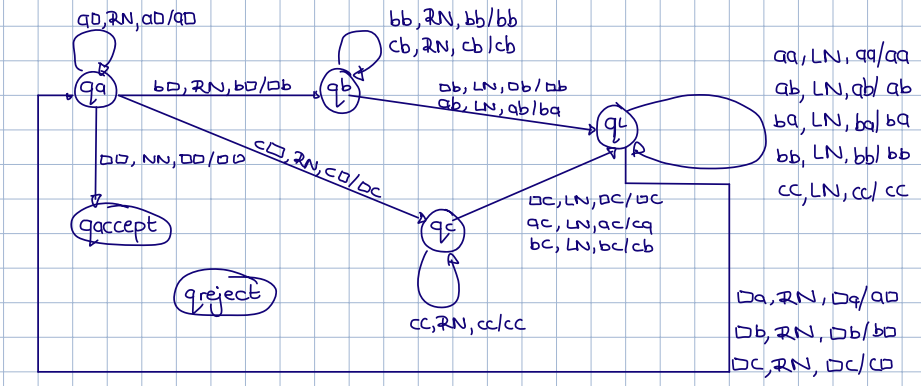
$q_{qL} 0 \rightarrow q_{qL} 0 L$
$q_{qL} 1 \rightarrow q_{qL} 1 L$
$q_{qL} x \rightarrow q_{qL} x L$
$q_{qL} \square \rightarrow q_b \square R$

$q_b 0 \rightarrow q_{bL} x L$
$q_b 1 \rightarrow q_b 1 R$
$q_b x \rightarrow q_b x R$
$q_b \square \rightarrow q_{reject} \square N$

$q_{bL} 0 \rightarrow q_{bL} 0 L$
$q_{bL} 1 \rightarrow q_{bL} 1 L$
$q_{bL} x \rightarrow q_{bL} x L$
$q_{bL} \square \rightarrow q_0 \square R$

$q_f 0 \rightarrow q_0 0 R$
$q_f 1 \rightarrow q_{0L} x L$
$q_f x \rightarrow q_f x R$
$q_f \square \rightarrow q_{accept} \square N$ }

Question 3



$M = (Q, \Sigma, \Gamma, \delta, q_q, q_{accept}, q_{reject})$
$Q = (q_a, q_b, q_c, q_L, q_{accept}, q_{reject})$
$\Sigma = (a, b, c)$
$\Gamma = \Sigma \cup \square$
$\delta = \varepsilon \quad q_q a \square \rightarrow q_a a \square R N$
$q_a b \square \rightarrow q_b \square b R N$
$q_a c \square \rightarrow q_c \square c R N$
$q_q \square \square \rightarrow q_{accept} \square \square N N$

$q_b \square b \to q_L \square b L N$

$q_b a b \to q_L b a N N$

$q_b b b \to q_b b b R N$

$q_b c b \to q_b c b R N$

$q_c \square c \to q_L \square c L N$

$q_c a c \to q_L c a L N$

$q_c b c \to q_L c b L N$

$q_c c c \to q_c c c R N$

$q_L \square a \to q_a a \square R N$

$q_L \square b \to q_a b \square R N$

$q_L \square c \to q_a c \square R N$

$q_L a a \to q_L a a L N$

$q_L a b \to q_L a b L N$

$q_L b a \to q_L b a L N$

$q_L b b \to q_L b b L N$

$q_L c c \to q_L c c L N$ }