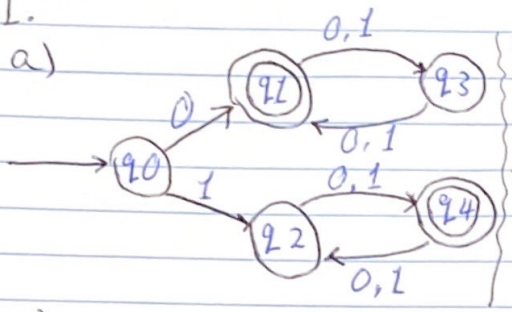
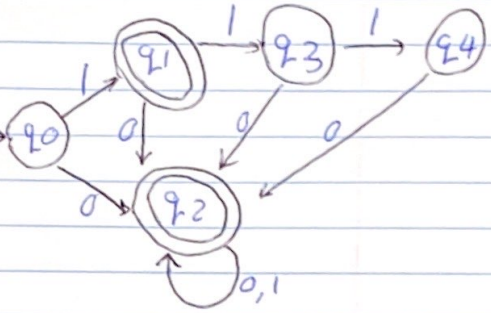
Homework 2

1.

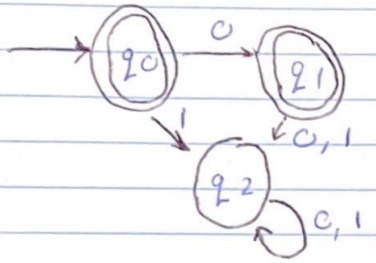
a)



b)



c)



2. As A and B are regular languages, Proof by contradiction is as follows:

$A - B \neq A \cap (B)^c$

$= A = (Q, \Sigma, \delta_1, q_1, F_1)$

$B = (Q_2, \Sigma, \delta_2, q_2, F_2)$

$= A \cap (B)^c = (Q_3, \Sigma, \delta_3, q_3, F_3)$, $Q_3 = Q_1 \times Q_2$, $q_3 = (q_1, q_2)$

$\delta_3((q_1, q_2), a) = (\delta_1(q_1, a), \delta(q_2, a))$

$= \{(q_1, q_2) \mid q_1 \in F_1 \text{ and } q_2 \in F_2\} = F_3 = F_1 \times F_2$

as a contradiction: $A - B \neq A \cap (B)^c$ contradicts $F_3 = F_1 \times F_2 = \{(q_1, q_2) \mid q_1 \in F_1, q_2 \in F_2\}$ which indicates set difference because it states everything in A that is not in B concluding that regular languages are closed under set difference.