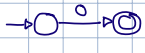
COS 210 Worksheet 5 Dylan Kapnias (u18108467)

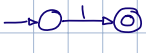
Question 1

Step 1:

M_1 :

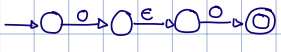


M_2 :

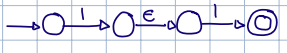


Step 2:

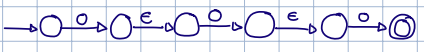
M_3 (00):



M_4 (11):

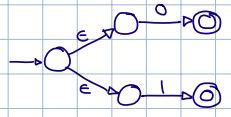


M_5 (000):

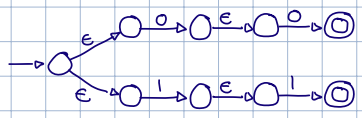


Step 3:

M_6 (0 ∪ 1) :

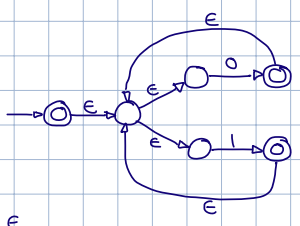


M_7 (00 ∪ 11) :

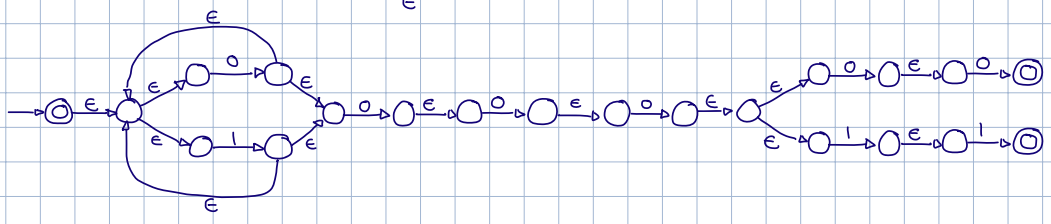


Step 4:

M_8 (0 ∪ 1)* :



NFA :



Question 2

$L_q = \epsilon \cup a \cdot L_q \cup b \cdot L_q$

$= \epsilon \cup L_q(a \cup b)$, Std. Equivalence 6

$L_q = L = B^*C = (a \cup b)^*\epsilon$, Lecture 9 Lemma

$L_q = (a \cup b)^*$, Std. Equivalence 2

Question 3

$L_q = a \cdot L_q \cup b \cdot L_q$

$= L_q(a \cup b) \cup \emptyset$, Std. Equivalence 6

$L_q = L = B^*C = (a \cup b)^*\emptyset$, Lecture 9 Lemma

$L_q = \emptyset$, Std. Equivalence 1

Question 4

$L_q = a \cdot L_q \cup b \cdot L_r$

$L_r = \epsilon \cup a \cdot L_r \cup b \cdot L_r$
$= \epsilon \cup L_r(a \cup b)$, Std. Equivalence 6
$L_r = L = \mathcal{B}^* C = (a \cup b)^* \epsilon$, Lecture 9 Lemma
$L_r = (a \cup b)^*$, Std. Equivalence 2

$\therefore L_q = a \cdot L_q \cup b \cdot (a \cup b)^*$, Substitution of L_r
$L_q = L = \mathcal{B}^* C = \underline{a^* b (a \cup b)^*}$, Lecture 9 Lemma