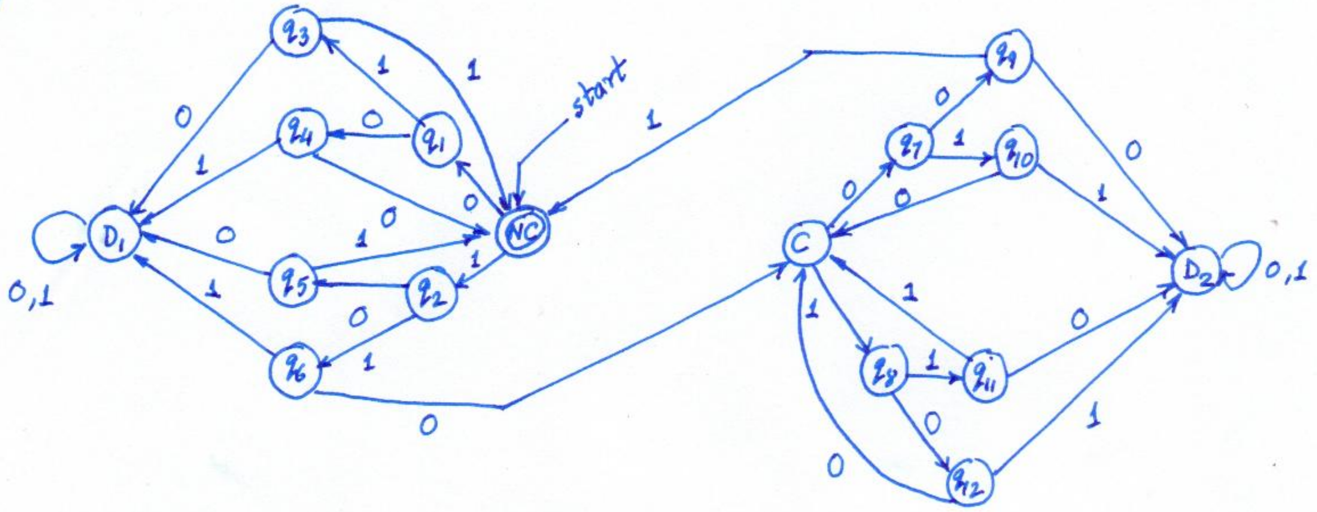
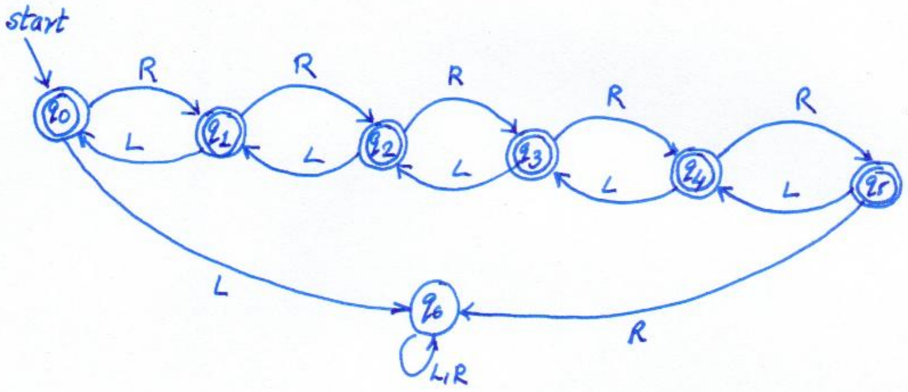
(1) (a) False
(b) False
(c) False
(d) True
(e) True

(2)



(3) (a)



(b) $L_T = \{ w \mid w \in \{L, R\}^*$, w has an equal number of L's and R's and starts with an R$\}$

Assume L_T is regular. Then the pumping lemma for regular languages holds for L_T. Let p be the pumping length.

Consider the word $w = R^p L^p \in L_T$

To break w into 3 parts $w = xyz$, such that $|xy| \leq p$, $|y| > 0$, all of xy must fall within the first p R's.

$\therefore$ w is broken up as $w = R^i R^j R^{p-i-j} L^p$; $x = R^i$; $y = R^j$; $z = R^{p-i-j} L^p$; $i+j \leq p$, $j > 0$

According to the pumping lemma $\forall_{k \geq 0}\, xy^k z \in L_T$

But $xy^0z = R^i R^{p-i-j} L^p = R^{p-j} L^p \notin L_T$ since $p-j \neq p$, $j > 0$

Hence our assumption that L_T is regular was wrong. L_T is not regular.

(c) $G = (\{S\}, \Sigma = \{L, R\}, P = \{$

$S \rightarrow RSLS \mid \epsilon$

$\}, S)$