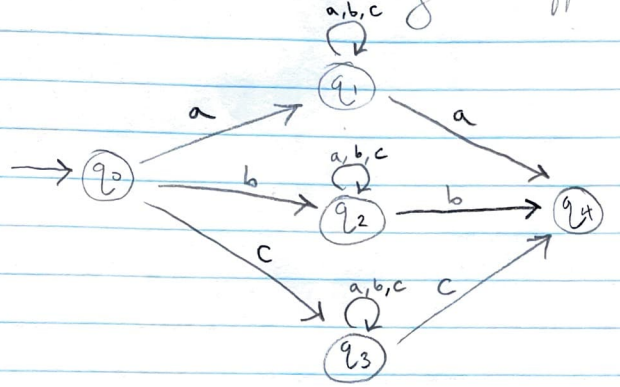
Dayton
DeKam

(1) $\Sigma = \{a, b, c\}$ for both parts a) & b)

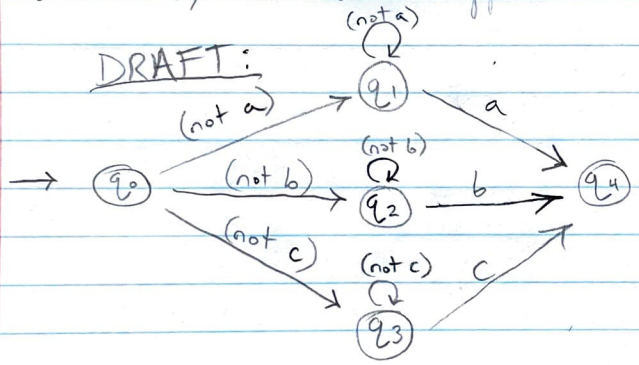
a) Last symbole in string has appeared before:

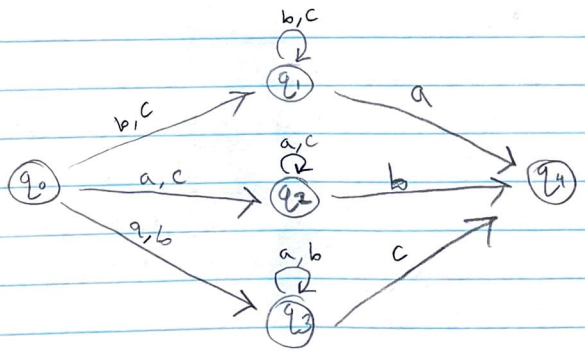


[acbca] ends at q_4

b) Last symbol has not appeared before

DRAFT:

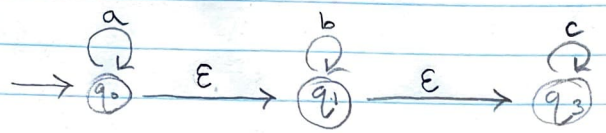




[cclbca] ends at q_4 after both states go to q_1 & q_2, where q_2 terminates but q_1 goes onto q_4

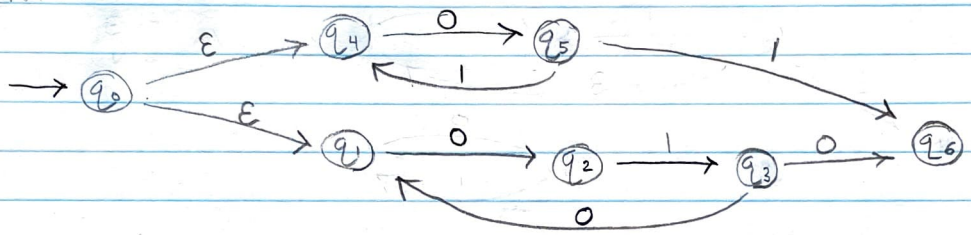
(2) a) $\Sigma = \{a, b, c\}$ Zero or more a's, zero or more b's, zero or more c's

ε-NFA:



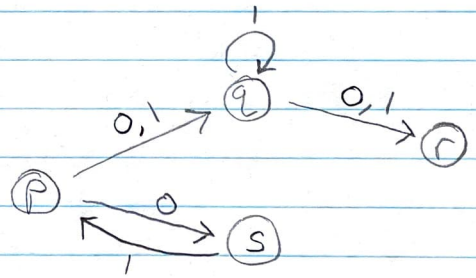
b) $\Sigma = \{0, 1\}$ 010 or 01 repeated one or more times

ε-NFA:

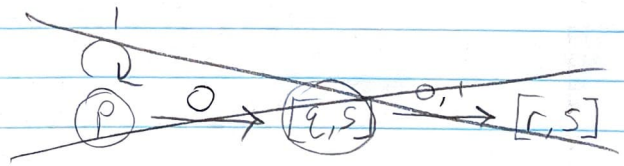


(3.)

δ_N	0	1
→p	{q, s}	{q}
*q	{r}	{q, r}
r	{s}	{p}
*s	∅	{p}



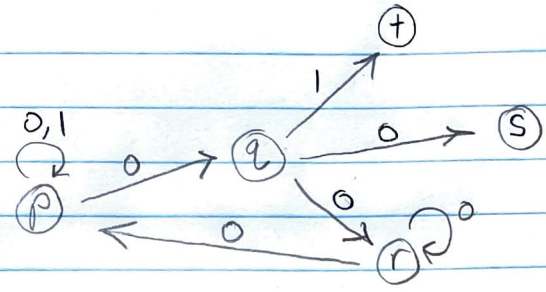
δ_D	0	1
→p	[q, s]	[q]
*[q, s]	[r, s]	[p, r]
q	[r]	[q, r]
[p, q]	[s, q, r]	[q, r]
[p, r]	[s, q, r]	[q, r]
[r, s]	∅	[p, r]



4.

a)

S_N	0	1
$\rightarrow p$	$\{p, q\}$	$\{p\}$
q	$\{r, s\}$	$\{t\}$
r	$\{p, r\}$	$\{t\}$
$*s$	$\emptyset$	$\emptyset$
$*t$	$\emptyset$	$\emptyset$



δ_D	0	1
$\rightarrow p$	$[p, q]$	$[p]$
$[p, q]$	$[p, q, s, r]$	$[p, t]$
$[p, t]$	$[p, q, t]$	$\emptyset$
$[p, q, s, r]$	$\emptyset$	$\emptyset$
$[p, q, t]$	$\emptyset$	$\emptyset$

b) The DFA begins at state "p" and terminates at states $[p, q, s, r]$ and $[p, q, t]$ due to every input resulting in the state remaining at one of those two final states, as noted by the $\emptyset$ symbol in the DFA table.