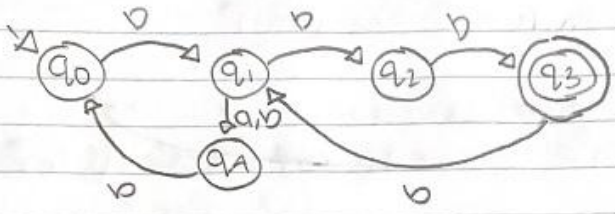
Homework #2

1) Design DFA for set {a,b}* where all strings start w/ zero or more {abb, bab}* and ends w/ abb

1) NFA



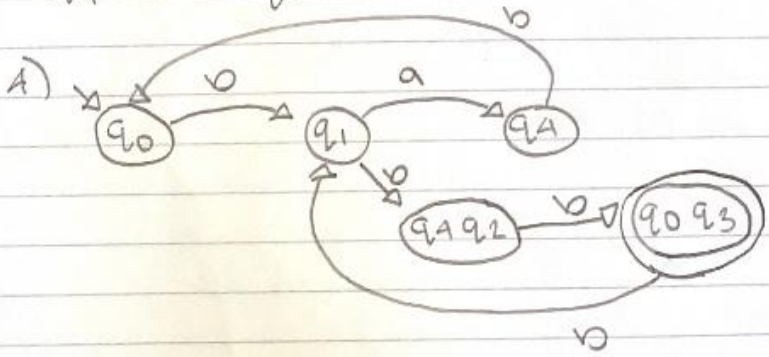
2) Transition table

S	a	b
q_0	0	q_1
q_1	q_A	$q_A q_2$
q_2	0	q_3
q_3	0	q_1
q_A	0	q_0

3) DFA Transition table

S	a	b
q_0	0	q_1
q_1	q_A	$q_A q_2$
$q_A q_2$	0	$q_0 q_3$
$q_0 q_3$	0	q_1
q_A	0	q_0

4)



2) Regex for {a,b} or {0,1}

a) exactly 3 occurrences of ba

$(a+b)^* ba (a+b)^* ba (a+b)^* ba (a+b)^*$

b) at most 3 occurrences of ba

$(a+b)^* (ba+\epsilon) (a+b)^* (ba+\epsilon) (a+b)^* (ba+\epsilon) (a+b)^*$

c) $L = \{a^n b^m \mid m+n \text{ is even}\}$

$a(aa)^* b(bb)^* + (aa)^*(bb)^*$

4) exactly 2 a's over a,b

$b^* a b^* a b^*$

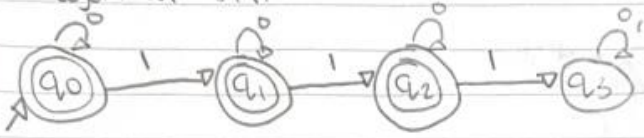
5) all strings w/ substring ccc over {a,b,c}

$(a+b)^* ccc (a+b)^*$

6) every 'a' has a length of 4 over {a,b,c}

$(b+c)^* (aaaa)(b+c)^* (aaaa)(b+c)^*$

3) regex for DFA



$q_0 = q_0 0 \quad = 0^*$

$q_1 = q_0 1 + q_1 0 = R = Q + RP = q_1 = 0^* 1 + q_1 0 = \underline{0^* 10^*}$

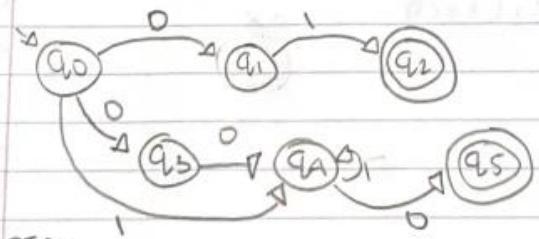
$q_2 = q_1 1 + q_2 0 = R = Q + RP = q_2 = 0^* 10^* 1 + q_2 0 = \underline{0^* 10^* 10^*}$

$q_3 = q_2 1 + q_3 0 + q_3 1$

$\boxed{0^* + 0^* 10^* + 0^* 10^* 10^*}$

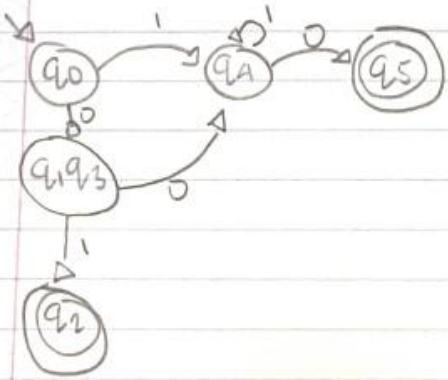
4) Create NFA

$01 + (1+00)1^* 0$



S	0	1
q_0	$q_1 q_3$	q_4
q_1	0	q_2
q_2	0	0
q_3	q_4	0
q_4	q_5	q_4
q_5	0	0

DFA:



S	0	1
q_0	$q_1 q_3$	q_4
$q_1 q_3$	q_4	q_2
q_1	0	q_2
q_2	0	0
q_3	q_4	0
q_4	q_5	q_4
q_5	0	0