A	14
B	32
C	2

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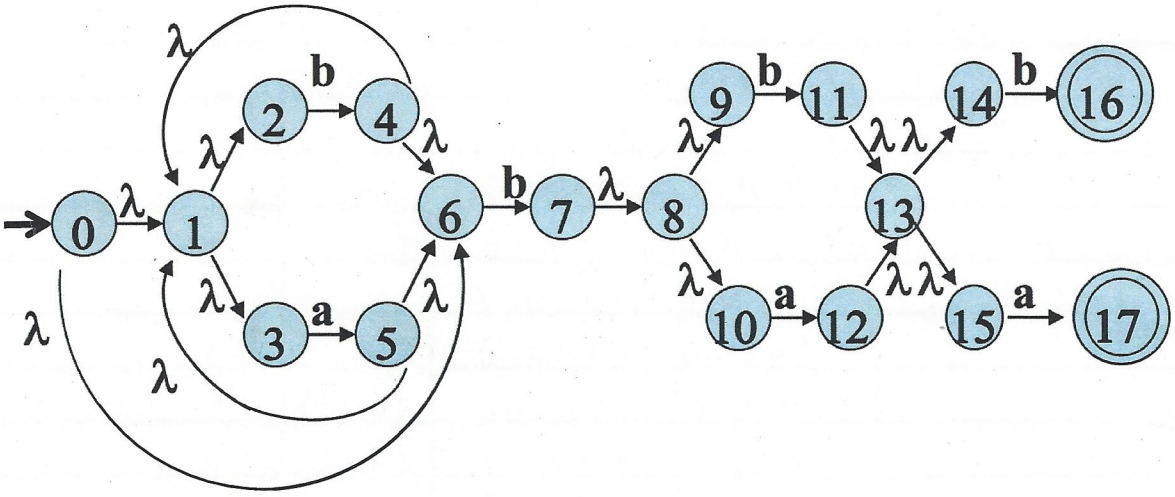
cs3186-Midterm #2 - Take Home Part

A. Construct an NFA for the regular expression:

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

Note: DO NOT NEED TO SHOW ALL intermediate steps just the final NFA

B. Find the DFA's transition table for the NFA below.



C. Given Σ = {a, b}:

1. Write a regular expression for the set: "All strings of a's and b's beginning with bb and not having three consecutive a's "

2. Describe in English the languages denoted by the following regular expression: (a + b)*b(a + b)*

3. Write a regular expression for the following language:
   L(w) = {w | w has exactly a single substring abaa or exactly a single substring babb}

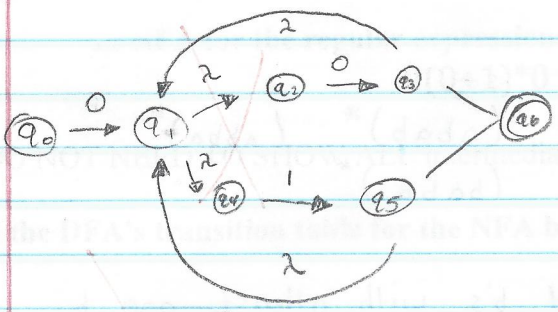
4. Write a regular expression for the following language:
   L(w) = {w | w ends in bb and does ~~not~~ contain the substring aba}

32

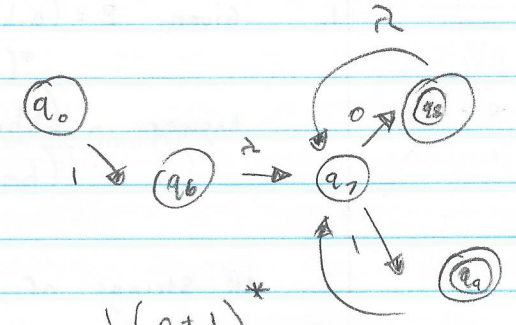
B.

	A: λ Closure (0) = {1,2,3,6,0}	✓	
B =	(A, a)	{1, 2, 3, 5, 6}	✓
C =	(A, b)	{1, 2, 3, 4, 6, 7, 8, 9, 10}	✓
B =	(B, a)	{1, 2, 3, 5, 6}	✓
C =	(B, b)	{1, 2, 3, 4, 6, 7, 8, 9, 10}	✓
D =	(C, a)	{1, 2, 3, 5, 6, 12, 13, 14, 15}	✓
E =	(C, b)	{1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15}	✓
F =	(D, a)	{1, 2, 3, 5, 6, 17}	✓
G =	(D, b)	{1, 2, 3, 4, 6, 7, 8, 9, 10, 16}	✓
H =	(E, a)	{1, 2, 3, 5, 6, 12, 13, 14, 15, 17}	✓
I =	(E, b)	{3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16} ✗	✓
B =	(F, a)	{5, 6, 1, 2, 3} ✓	✓
C =	(F, b)	{1, 2, 3, 4, 6, 7, 8, 9, 10} ✓	✓
D =	(G, a)	{1, 2, 3, 5, 6, 12, 13, 14, 15} ✓	✓
C =	(G, b)	{1, 2, 3, 4, 6, 7, 8, 9, 16} ✗	✓
F =	(H, a)	{1, 2, 3, 5, 6, 17} ✓	✓
G =	(H, b)	{1, 2, 3, 4, 6, 7, 8, 9, 10, 16} ✓	✓
H =	(I, a)	{1, 2, 3, 5, 6, 12, 13, 14, 15, 17} ✓	✓
I =	(I, b)	{3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16} ✗	✓

A. $0(0+1)^*0 + 1(0+1)^*$

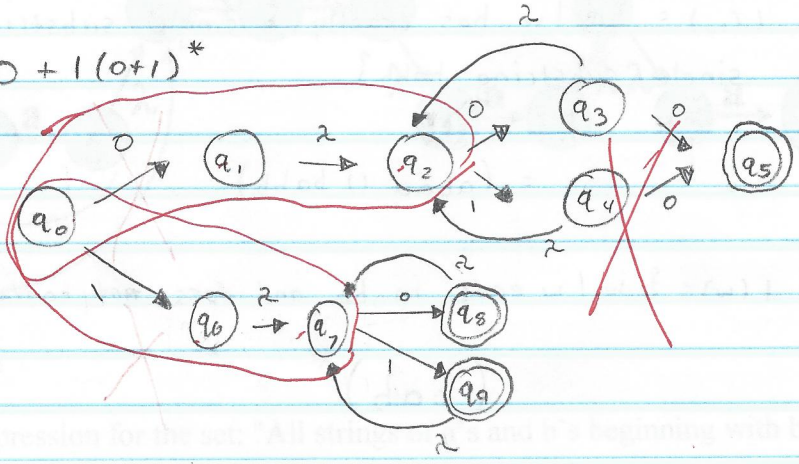


$0(0+1)^*0$



$1(0+1)^*$

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



States: $5 \times 2 = 10$

$\lambda \quad 2 \times 2 = 4$

14

C.

1. Given $\Sigma = (a, b)$

Answer: $(bbab)^*$ $(abab)^*$ $(abba)^*$
$(baab)^*$ $(baba)^*$

2. All strings of a's and b's with atleast one b

3. $L(w) = \{w \mid w$ has exactly a single substring abaa or exactly a single substring babb$\}$

$= (abaa \cup babb)$

4. $L(w) = \{w \mid w$ ends in bb and does ~~not~~ contain the substring aba$\}$

$(bab)^*$