CSci 435: Formal Languages and Automata

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**Home Assignment 2: 100 points + 10 points (optional)**

\*Q1. [10] Find all strings in L((*ab* + *b*)\* b (*a* + *ab*)\*) of length ***less than*** four.

L = {b, bb, ba, abb, bab, bbb, bba, baa}

\*Q2. [10] Give a ***regular expression*** for the language

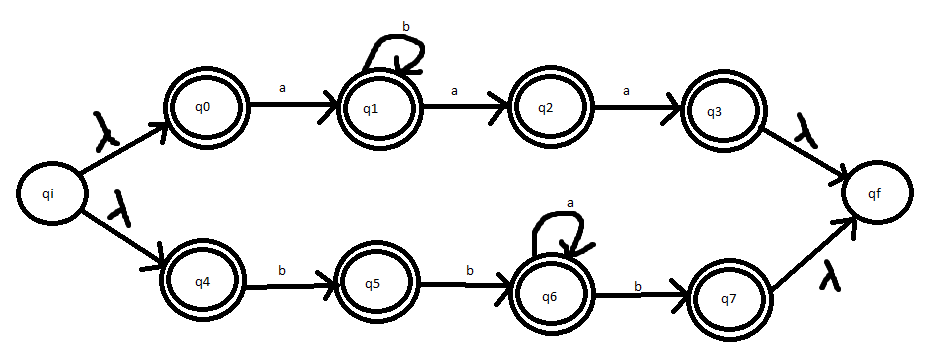
1. [10] L = {*anbm* | (*n*+*m*) is odd}.

L((aa)\*(bb)\*a +(aa)\*(bb)\*b ) ={a, b, aaa, abb, baa, bbb, …}

1. [10, optional] L = {*w* ∈ {*a, b*}\* | ( *na*(*w*) - *nb*(*w*) ) mod 3 = 0}. Hint: Apply Thm 3.2. .

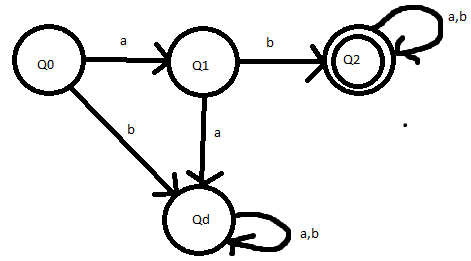
No Answer.

Q3. [10] Using the construction in Theorem 3.1, construct an NFA that accepts the complement of the

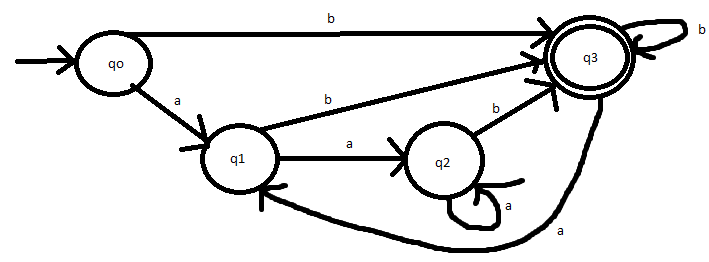
Language L(*ab*\**aa* + *bba*\**ab*).

\*Q4. [20] Construct a ***minimal DFA*** that accepts the following language

1. [10] L(*ab*(*a*+*ab*)\*(*a*+*aa*))



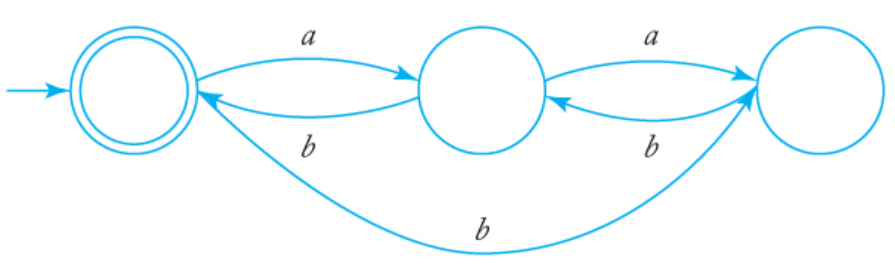
1. [10] L((*aa*\*)\**b*)\*)



Hint: Start with constructing an NFA (by Theorem 3.1), convert it to DFA, then get the minimal DFA by mark & reduce procedures.

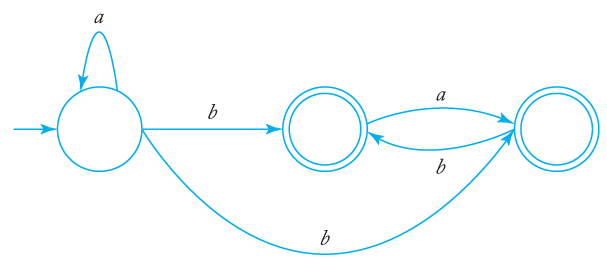
\*Q5. [20] Find ***regular expressions*** for the languages accepted by the following automaton.

1. [10]



RE= L[(a((ab)\*+b)) + (b((ba)\*+bb)]

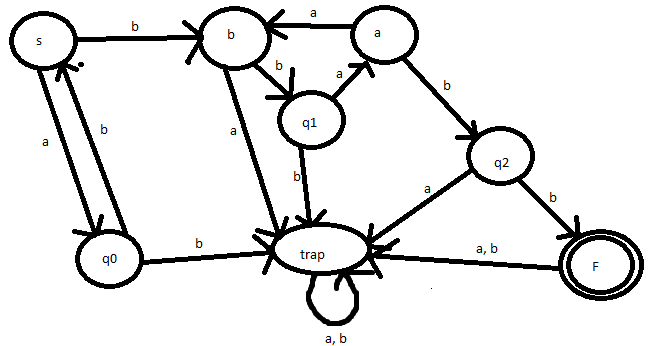
1. [10]



RE = L[(a\*b) + (a\*b(ba)\*)]

Q6. [10] Construct a ***DFA*** that accepts the language generated by the *grammar*

S → *ab*S | B, A → *a*B | *bb,* B → *ba*A.



\*Q7. [20] Find a ***regular grammar*** that generates the language on Σ={a, b}

1. [10] *L*(*aa*\*(*ab*+*a*)\*)

G = {V, T, S, P}

V = {S, A, B}

T = {a, b}

P ={S->aA, A-> aA |aB | λ, B -> bA}

1. [10] the language consisting of all strings with no more than two *a*’s.

G = {V, T, S, P}

V = {S, A, B}

T = {a,b}

P = {S->bS | aB| λ, A->bA | aB| λ, B-> bB | λ}