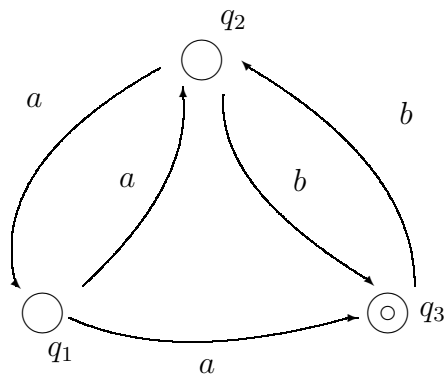


(1) Convert the following NFA to a regular expression:



(2) Convert the above NFA to an equivalent DFA.

(3) Let  $L = L((buaa)^*(aubb)^*)$ . Construct an NFA and a DFA which accept  $L$ . List all  $w \in L$  of length 3.

(4) Prove that if  $L_1$  is regular and  $L_2$  is context-free then  $L_1L_2$  is context-free.

(5) Let  $L = \{w : w \text{ has even length and first half of } w \text{ is all a's}\}$ . In other words,  $L = \{a^n u : |u| = n\}$ . Either prove  $L$  is not context-free or give a context-free grammar and a PDA for  $L$ .

(6) Prove  $\{a^i b^j c^k : i = \min\{j, k\}\}$  is not context-free.

(7) Prove  $\{a^i b^j c^k : i = j, k\}$  is not context-free.

Also work problems from prior year final examinations.