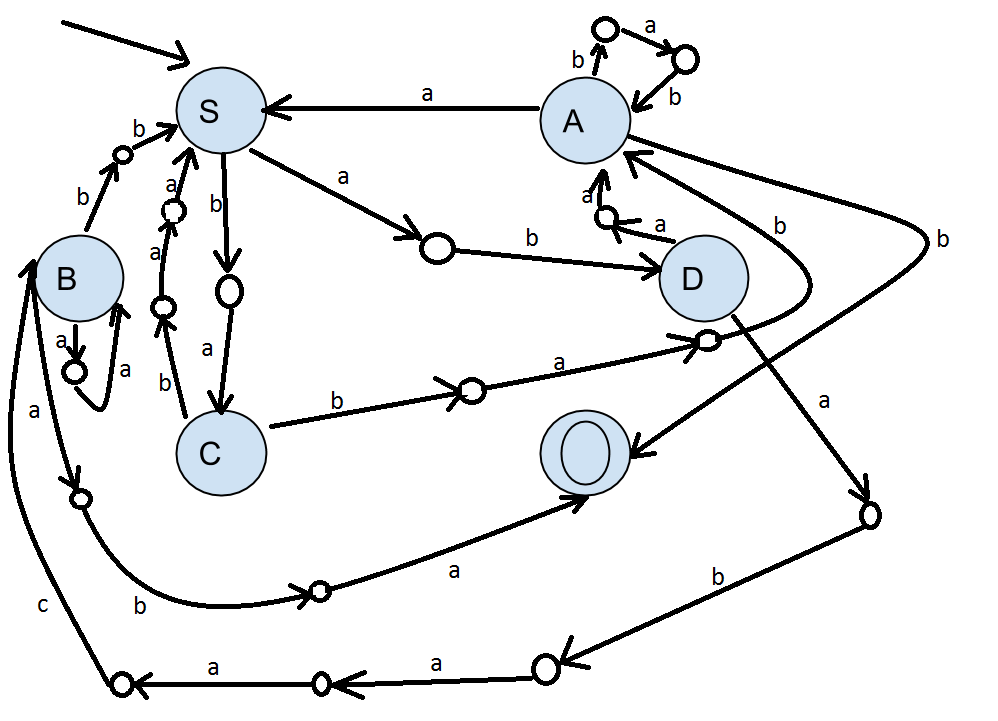
Comp 310 Homework # 3

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**Problem 1.** Create an NFA that accepts the language generated by the right linear grammar below.

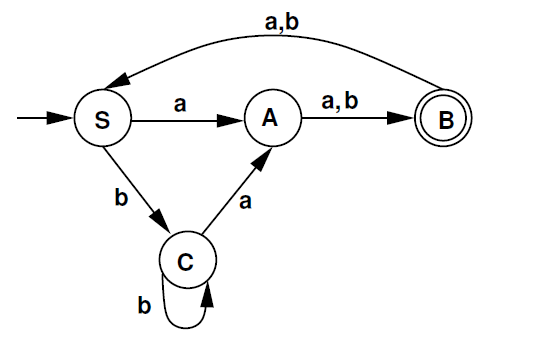
 S -> abD | baC

A -> babA | aS | b

B -> aaB | bbS | aba

C -> baaS | babA

D -> aaA | abaacB

**Problem 2.** Create a regular grammar that generates the same language accepted by the DFA below.

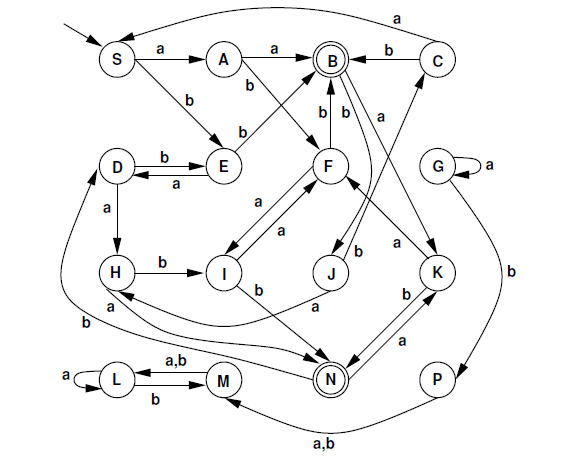
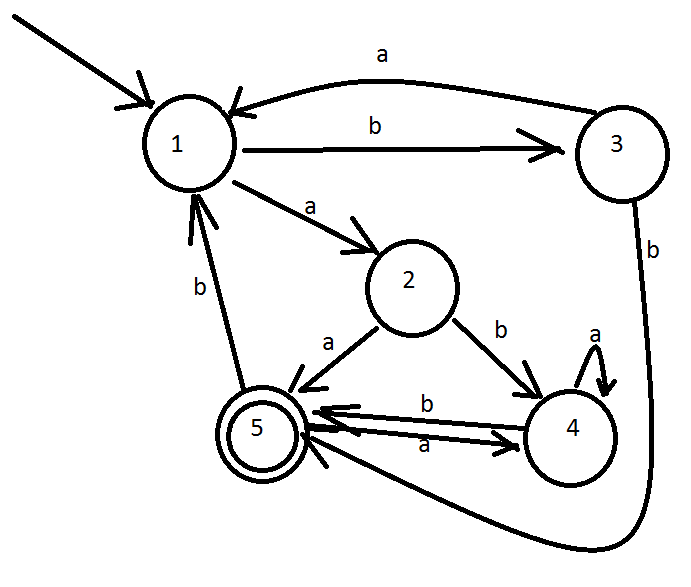
S -> aA | bC

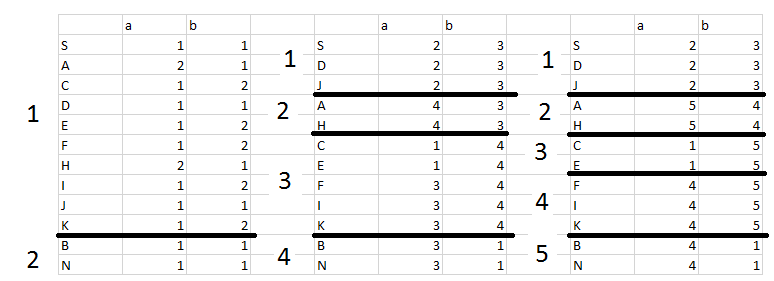
A -> aB | bB

B -> aS | bS | λ

C -> aA | bC

**Problem 3.** Minimize the DFA below.





**Problem 4.** Show that is not regular.

Assume is regular, then P.L. applies.

Fix the N given by P.L.

Let

There is a split w = xyz with

Repeat y 400 times.

**Problem 5.** Show that is not regular.

Assume is regular, then the Pumping Lemma applies.

Fix the N given by P.L.

Let w =

There exists a split

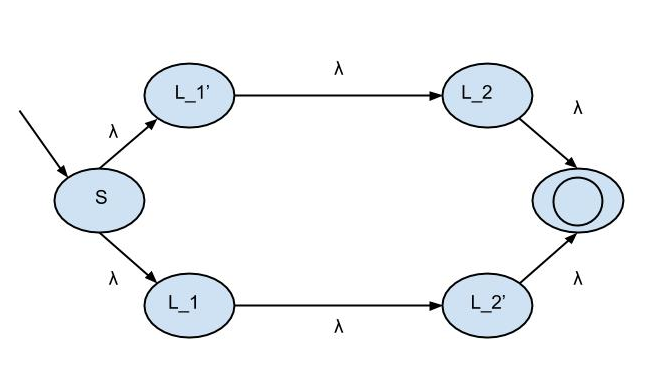
Repeat y 20 times.

**Problem 6.** If L is regular and then show:

1. L’ can be regular and
2. L’ need not be regular.

**Problem 7.** Show that if L1 and L2 are regular then L1ΔL2 must also be regular.

It can be shown that if a language L is regular then its compliment L’ must be regular also. (Simply make all the end states non-ending, and all the non-ending end states in a given DFA.) Given a NFA which divides from the start state via lambda into two branches, and transitions once again via lambda from L1’ to L2 and from L1 to L2’. Because this NFA exists, we can therefore conclude that L1ΔL2 must be regular.



Note: The ending edges labeled as lambda to the final state should come from any ending state in the previous group of states (L\_2, or L\_2’).

**Problem 8.** For a language L define. Show that if L is regular then Suffix (L) is regular.

Because L is regular, it has several NFA’s that accept it. Modify any of these NFA’s with an extra state which will act as the new start state. Add an edge between the new start state to every **reachable (traversable)** state from the original start state which from there can also be traversed to the final state. This results in a NFA which will represent Suffix(L) which is regular. Therefore, SUFFIX(L) must be regular.