Eric Altenburg Problem Set 3 1

9/20/19 CS-334

I pledge my honor that I have abided by the Stevens Honor System. - Eric Altenburg

1. a) $\{w \in \{a,b\}^* : w$ contains the string aa but not the string bb $\}$

$(a \cup ba)(ba)^* a^+ (a \cup (ba))^* (b \cup \varepsilon)(ab)^*$

b) $\{w \in \{a,b\}^* : w$ contains an even # of a's but doesn't contain string aa $\}$

$b^*((ab^+a) \cup (ab^+ab^+)^*)b^*$

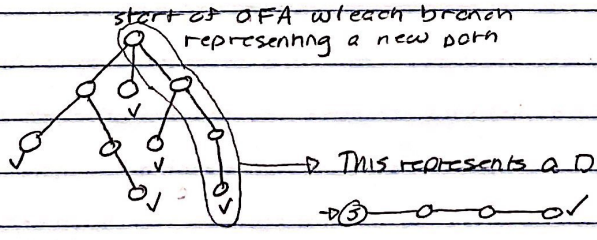
c) $/\#(a \cup b \cup / \cup (\#^*(a \cup b)))^* \#/$

2. Using the knowledge that DFA's only function when it is given a regular language, it can be said that the DFA only accepts all regular languages. From this, if a relationship between the two types of machines, then the same can apply for OFA's.

With the use of NFA's, when processing input and it encounters an ε transition, it will clone itself. For the NFA to function, at least 1 clone must end up in an accept state. This differs for OFA's in that all of the "clones" must be accept states. This similar to how a DFA functions, all of the input paths that are recognized end in an accept state even though its only one "path" that is followed. This means that a DFA is basically an OFA. One can say that technically all of the OFA clone paths is its own DFA.

Therefore, an OFA is composed of DFA's making it a DFA, and since a DFA accepts it, it is considered a regular language.

Visual:



3.

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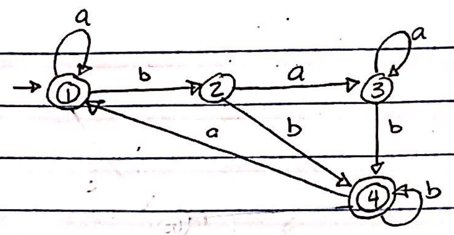

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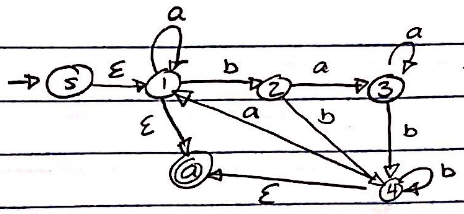

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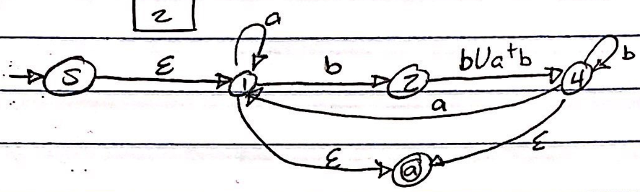

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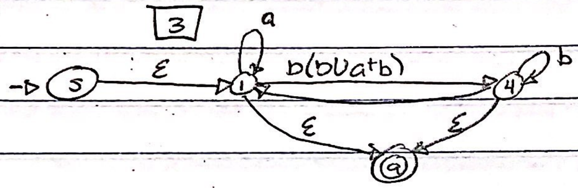

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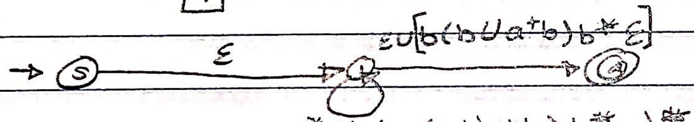

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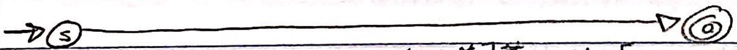

$[a^* \cup (b(b \cup a^+b)b^*a)^*]^* \cup [b(b \cup a^+b)b^*] \cup \varepsilon$