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Problem Set #3
September 20, 2019
I PLEDGE MY HONOR THAT I HAVE ABIDED BY THE STEVENS HONOR SYSTEM.

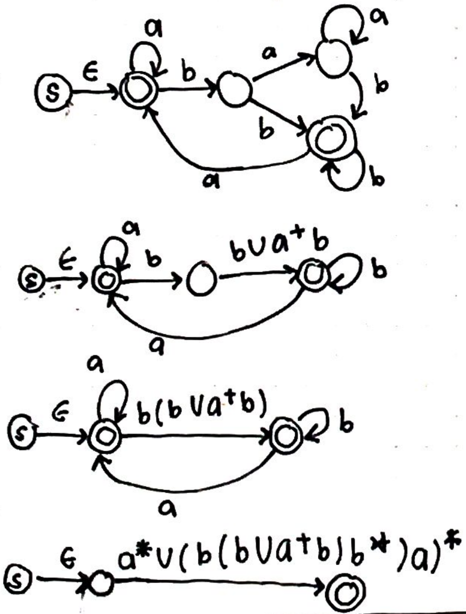
1A. $(a \cup ba)(ba)^* a^+ (a \cup (ba))^* (b \cup \varepsilon)(ab)^*$

1B. $b^* ((ab^+a) \cup (ab^+ab^+)^*) b^*$

1C. $/\#(a \cup b \cup / \cup (\#^* (a \cup b)))^* \#/$

2. We know that a DFA only accepts all regular languages (and only accepts regular languages). With NFAs, whenever it encounters an ε transition, there are paths that continue to duplicate itself (and keep going through said states). If an OFA is a DFA, this would occur in an OFA as well. NFAs work as follows: at least one clone/copy must end up in an accept state. For OFAs, the clones that do not end up in reject states MUST end in an accept state.
Because of this, all input paths are recognized and end in an accept state even since only one path is followed (technically). This also means that a DFA is also an OFA; because of this, you can say that an OFA's paths is an DFA. Hence, an OFA is a DFA and a DFA only accepts regular languages, therefore an OFA only accepts regular languages. Thus, an OFA only accepts an input string IFF every possible final state after the entire input state has been processed is an accept state of the ~~DFA~~ machine. So... proven?

3.



Ignore this

$\boxed{\cancel{\text{Regular Expression: } a^* \cup (b(b \cup a^+b)b^*)a)^*}}$

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

THIS