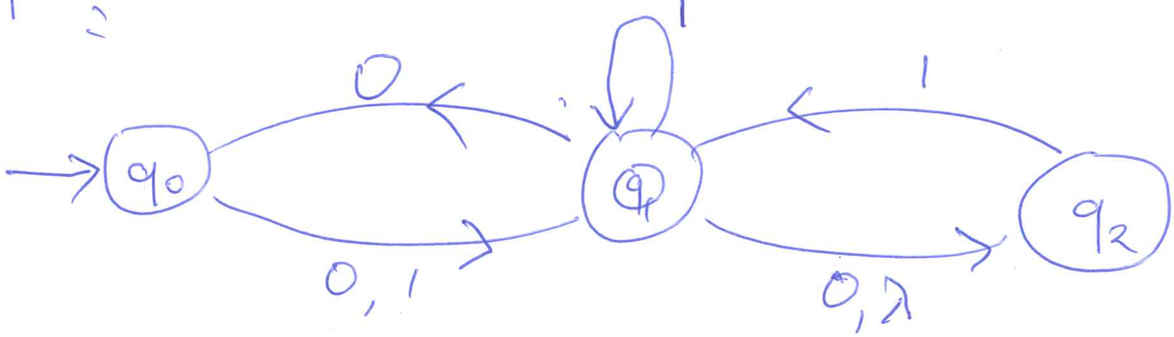
Homework problem:

9/10/18

Show 000 is accepted by M:



M accepts $\overset{w}{000}$ starting at $\overset{q}{q_0}$ because $\overset{u}{0}, \overset{v}{00} \in \Sigma^*$, $\overset{q'}{q_1} \in Q$, and $\overset{w}{000} = \underbrace{0}_{u}\underbrace{00}_{v}$, $(\underset{q}{q_0}, \underset{u}{0}, \underset{q'}{q_1}) \in \delta$, and M accepts $\underset{v}{00}$ starting at $\underset{q'}{q_1}$

We know M accepts 00 starting at q_1 since M accepts 0 starting at q_0 and $(q_1, 0, q_0) \in \delta$.

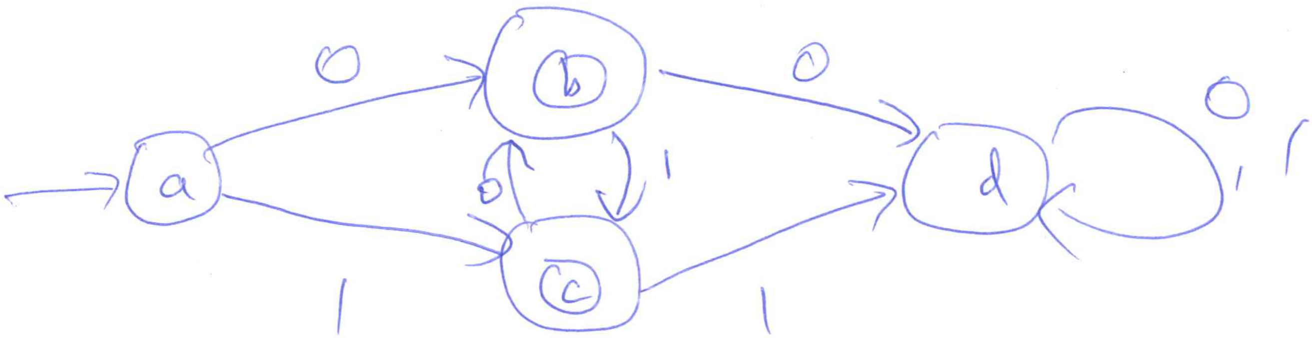
We know M accepts 0 starting at q_0 since M accepts λ starting at q_1 and $(q_0, 0, q_1) \in \delta$

We know M accepts λ starting at q_1 since $q_1 \in F$.

I really should have written this in ~~the~~ reverse order so that I proceed from what I already know to what I want to prove.

Back one HW problem:

Prove that M accepts a string starting at 'a' if and only if it is nonempty and follows the alt. rule.



You already have lemmas about acceptance starting at b/c/d.

To do this correctly, you need to prove both that M accepts strings that it should and M rejects strings that it should.

If $w = \lambda$, M rejects w starting at a since $a \notin F$.

If $w = 0w'$, ~~then M accep~~

and w follows the alt rule, then $w' = \lambda$ or w' starts with a 1 and follows the alt rule. By Lemma B, M accepts w' starting at b. Since $b = \delta(a, 0)$, M accepts $w = 0w'$ starting at a.

On the other hand, if $w = 0w'$ does not follow the alt rule, either w' does not begin with a 1 or w' does not follow the alt rule, so by Lemma B, M does not accept w' starting at $b = \delta(a, 0)$, so M does not accept w starting at a.

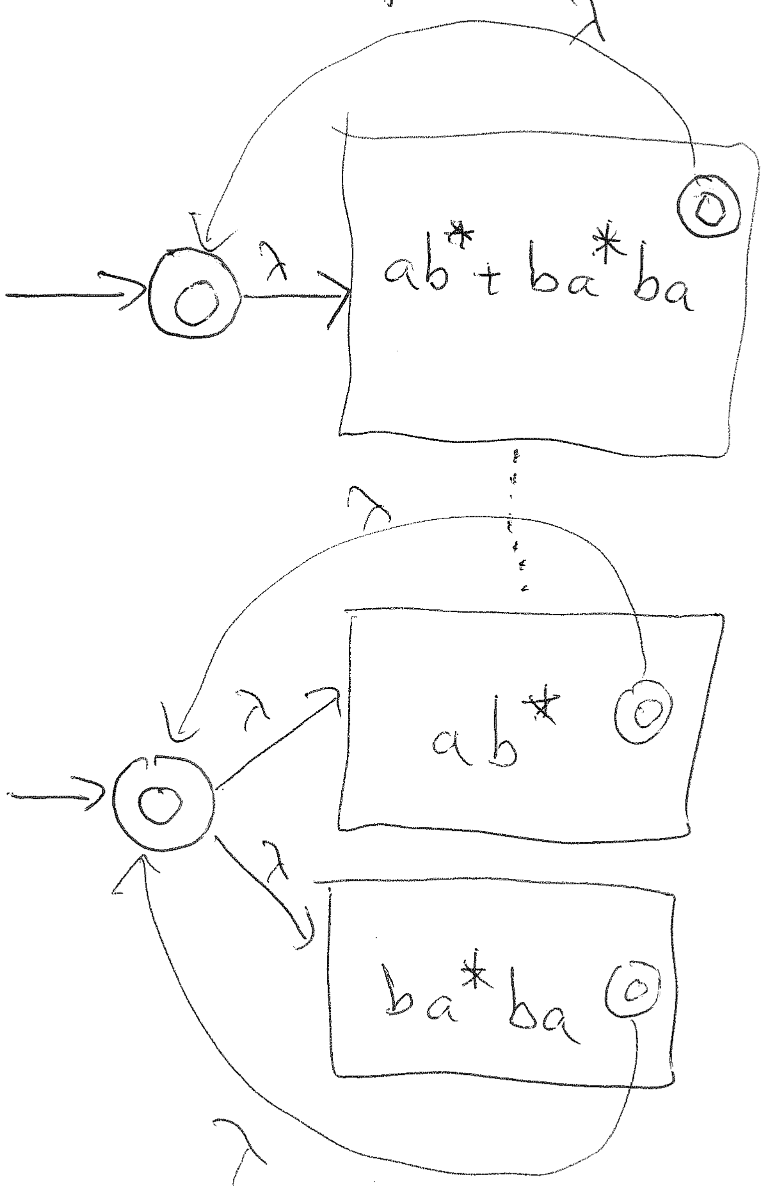
If $w = 1w'$, we have a similar pf with b replaced by $c = \delta(a, 1)$.

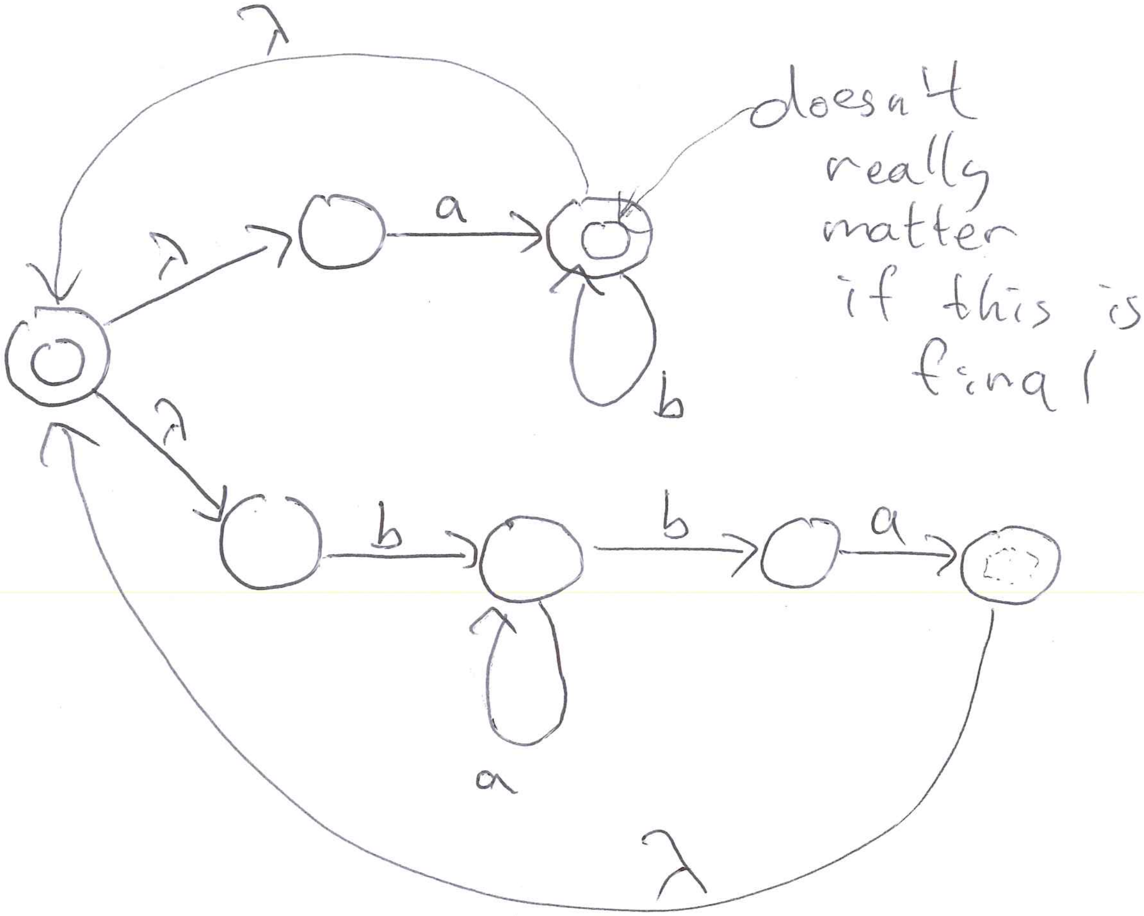
Note: we appeal to Lemma B here, not induction - appealing to inductive hypothesis means using a "smaller" case of the stmt you're trying to prove.

More practice constructing NFAs from regular expressions and vice versa:

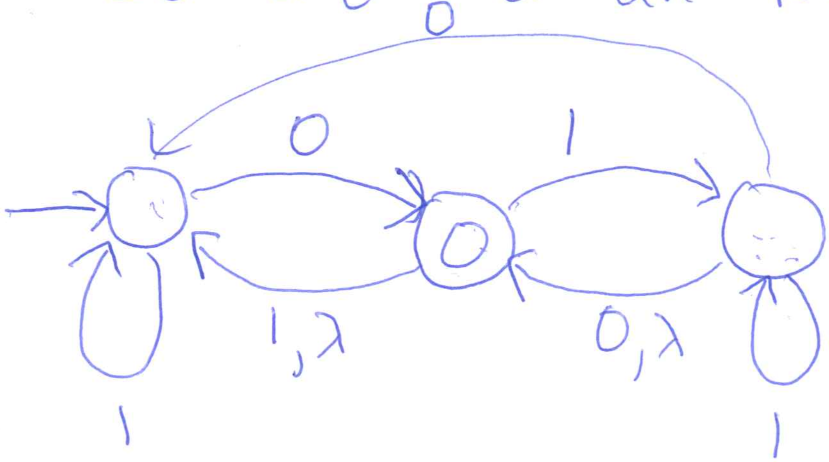
Take the R.E. $(ab^* + ba^*ba)^*$

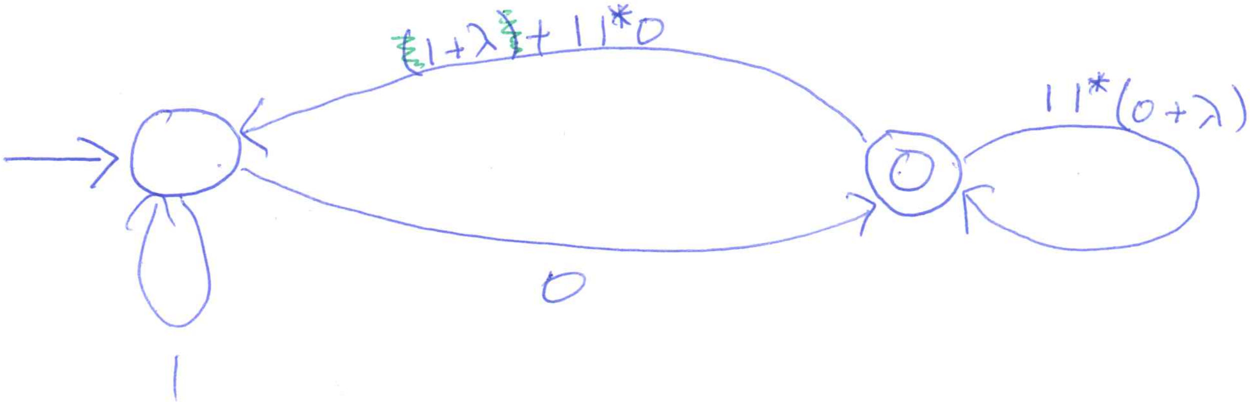
Construct an NFA that accepts precisely the strings that match this RE.

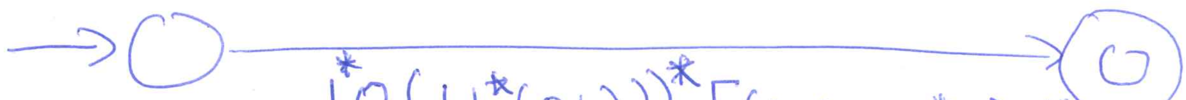




Convert to an RE







$$1^*0(11^*(0+\lambda))^*\left[(1+\lambda+11^*0)1^*0(11^*(0+\lambda))^*\right]^*$$

Daily HW: 3.2.1, 3.2.8