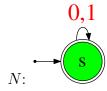
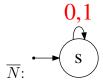
February 4, 2019

Consider an NFA $N=(Q,\Sigma,\delta,s,A)$. A standard mental exercise is to try and negate it. Namely, consider the NFA $\overline{N}=(Q,\Sigma,\delta,s,Q\setminus A)$.

1. $L(\overline{N}) = \overline{L(N)}$:

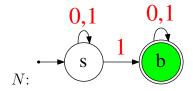


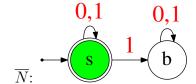


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 $L(N) = \{0, 1\}^*$, and $L(\overline{N}) = \emptyset$.

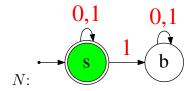
2. $L(N) \subsetneq L(\overline{N})$:

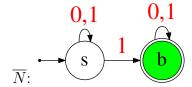




 $L(N) = (0+1)^*1(0+1)^*$, and $L(\overline{N}) = \Sigma^*$.

3. $L(N) \nsubseteq L(\overline{N})$:





 $L(N) = \Sigma^* \text{ and } L(\overline{N}) = (0+1)^* 1(0+1)^*.$

In conclusion, there is no meaningful relation between L(N) and $L(\overline{N})$. As such, negating an NFA directly odes not lead to an NFA for the complement language.