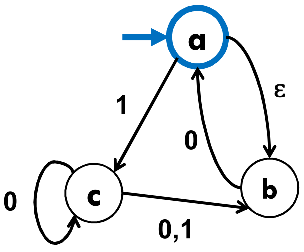
NFA that recognizes “binary strings with a 1 in the third position from the end”

“Perfect Guesser”: The NFA has input x, and whenever there is a choice of what to do, it magically guesses a transition that will eventually lead to acceptance (if one exists)

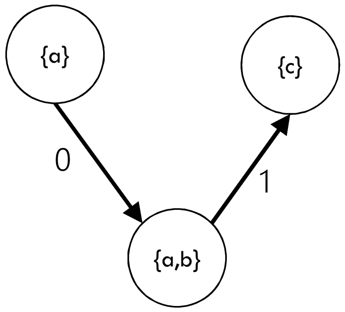
Perfect guesser view makes this easier.

Design an NFA for the language in the title.

An example (starting point)



N



D

Let $P(A)$ be "There is an NFA whose language is the same as the language for A."

Base Cases:

$\emptyset$

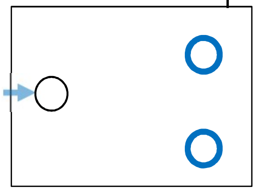
ε

a ($a \in \Sigma$)

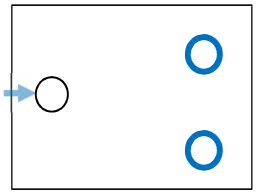
Let $P(A)$ be "There is an NFA whose language is the same as the language for A."

Let R be a regex not covered by the base cases. By the exclusion rule, $R = A \cup B$ or AB or A^* from some regexes A, B
Inductive Hypothesis: Suppose $P(A)$ and $P(B)$.

Inductive Step: Case 2: AB



N_A



N_B

Want a machine that accepts exactly strings matched by AB.