Discussion Handout 4

Problem One: Designing DFAs

i. Let $\Sigma = \{a, b\}$ and let $L = \{ w \in \Sigma^* \mid w$ is a nonempty string whose characters alternate between a's and b's $\}$ Design a DFA whose language is L.

ii. Let $\Sigma = \{a, b\}$ and let $L = \{ w \in \Sigma^* \mid$ there are an odd number of a's and even number of b's in $w \}$. Design a DFA whose language is L.

iii. Let $\Sigma = \{a, b, c\}$ and let $L = \{ w \in \Sigma^* \mid w \neq \varepsilon$ and the first and last characters of w are the same $\}$. Design a DFA whose language is L.

Problem Two: Designing NFAs

i. Let $\Sigma = \{a, b\}$ and let $L = \{ w \in \Sigma^* \mid$ the third-from-last character of w is $a \}$. Design an NFA for L.

ii. Using the subset construction, convert your NFA from part (i) into an equivalent DFA. (Although you could just directly design a DFA for this language, we want you to practice using the subset construction to get a sense of how it works.)