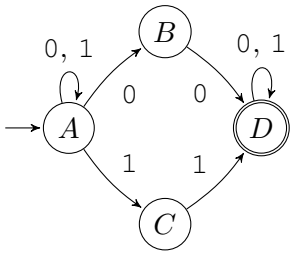
Week 3 Tutorial Session

Tutorial exercises include more problems than what a typical student can solve in 20–25 minutes. Don't be discouraged if you cannot solve all the problems within the time limit.

1. Convert the following NFA into a DFA using the algorithm from the lecture.



2. Prove that every NFA can be converted into an equivalent one that has a single accepting state.

3. (a) Write down the definition of regular languages over an alphabet Σ.
   (b) Write down the definition of regular expressions over an alphabet Σ.
   (c) Given a string w, define w^R as the string w in reverse order. That is, if $w = w_1 w_2 \dots w_n$, then $w^R = w_n w_{n-1} \dots w_1$. For example, if $w = \texttt{live}$, then $w^R = \texttt{evil}$.
   Given a language L, define its reversal L^R as the set of strings in L in reverse. More precisely, $L^R = \{w^R \mid w \in L\}$. For example, if $L = \{\texttt{live}, \texttt{raw}, \texttt{level}\}$, then $L^R = \{\texttt{evil}, \texttt{war}, \texttt{level}\}$.
   If L is a regular language, prove that L^R as also regular.