Tutorial 3

1. Prove that any NFA can be converted to another NFA with a single accept state [Hint: Remember that on an ϵ transition, we do not consume any input; our transition is immediate.]

2. Draw NFAs for the following languages over $\Sigma = \{0, 1\}$:

   (a) $\{s|\ s \in \Sigma^*, s$ has 1 in every odd position$\}$ [Hint: Remember that every DFA is also an NFA]

   (b) $\{0^n 1^m 0^p \mid n, m \geq 0 \ \wedge \ p > 1\}$ [Hint: Remember that NFAs have magical superpowers to know when portions of the string are "finished"]

   (c) $\{\epsilon\}$

   (d) $\{s \mid s \in \Sigma^*,$ contains an even number of 1s or an odd number of 0s$\}$ [Hint recall that we can create an NFA for a union of two languages by creating separate machines for each, creating a single start state and then connecting the two machines with a single ϵ transition]

3. Show that if $L_1, L_2,$ and L_3 are regular languages, then $L_2 \bigcirc ((L_1 \cap L_2) \cup L_3)$ is also regular. [Hint you may assume that union, intersection and concatenation are closed under the set of regular languages].