HW 3
In the problems below, $\Lambda$ represents the empty string.

1. Draw a NFA or a NFA-$\Lambda$ recognizing the language corresponding to the following regular expressions over $\Sigma = \{0, 1\}$.
   
   (a) $(0 + 1)^*(011 + 01010)(0 + 1)^*$
   (b) $(0 + 1)(01)^*(011)^*$
   (c) $010^* + 0(01 + 10)^*11$

2. Draw a NFA-$\Lambda$ for the language represented by the regular expression $\{0\}^*\{01\}^*\{1\} \cup \{1\}^*\{0\}$. Then convert this to a NFA and a DFA.

3. Give an example of a regular language $L$ containing $\Lambda$ that cannot be accepted by any NFA having only one accepting state. On the other hand, can every regular language not containing $\Lambda$ be accepted by an NFA having only one accept state? Prove your answer.

4. Use the Pumping Lemma to show that the following languages are not regular.
   
   (a) $L = \{a^n b^k : n > k \text{ and } n \geq 0\}$
   (b) $\Sigma = \{a, b\}$ and $L = \{\text{The set of palindromes}\}$
   (c) $L = \{a^i | i \geq 0\}$