Due September 14

1. Give DFAs that recognize the following languages
   (a) \( \{ w \in \{0,1\}^* | w \text{ contains at least two 0's} \} \).
   (b) \( \{ w \in \{0,1\}^* | w \text{ contains 110 as a substring } \} \).
   (c) \( \{01,111\}^* \).

2. Using the complementation construction and one of the DFAs from Exercise 1, give a DFA that recognizes the language
   \( \{ w \in \{0,1\}^* | w \text{ does not contain 110 as a substring} \} \).

3. Let \( A \) be the language \( \{ 0^n 1^n | n \geq 0 \} \). What is wrong with the following “proof” that \( A \) is regular?
   
   **Proof:**
   Consider the DFA given below

   ![DFA Diagram]

   The DFA accepts every string in \( A \), so \( A \) is regular.