(For Group 1)

1. (**Hint**: see solution of 1.40 (a) pg. 113) A string x is a prefix of a string y if a string z exists where $xz = y$, and that x is a proper prefix of y if in addition $x \neq y$. Let, A be a regular language and we define a new language B as follows
   B={ $w \mid w \in A$ $but\ w\ is\ not\ a\ proper\ prefix\ of\ any\ string\ in\ A$ }
   If $M = (Q, \Sigma, \delta, q_0, F)$ is the DFA recognizing A, construct the DFA M' that will recognize B.

2. Use pumping lemma to show that the following language is not regular
   $\{www \mid w \in \{a, b\}^*\}$

3. (**Hint**: see solution of 1.4(b) pg 83) Construct the minimized DFA and give the regular expression for the following language ($\sum = \{a, b\}$)
   $$\{w \mid w\ has\ even\ length\ and\ an\ odd\ number\ of\ a's\}$$

4. (**Hint**: see solution of 1.5(b) pg 84) Construct the minimized DFA and give the regular expression for the following language ($\sum = \{a, b\}$)
   $$\{w \mid w\ constains\ neither\ the\ substrings\ ab\ nor\ ba\}$$

5. (**Hint**: see solution of 1.5(b) pg 84) Construct the minimized DFA and give the regular expression for the following language ($\sum = \{a, b\}$)
   $$\{w \mid w\ is\ a\ string\ that\ does\ not\ contain\ exactly\ two\ a's\}$$

6. (**Hint**: Describe D more simply first) Let,
   $D =$
   $\{w|contains\ an\ even\ number\ of\ a's\ and\ an\ odd\ number\ of\ b's\ and\ does\ not\ contain\ the\ substring\ ab\}$

   ($\sum = \{a, b\}$). Give a DFA with **five states** that recognizes D and a regular expression that generates D.