(For Group 3)

1. (**Hint**: see solution of 1.4(b) pg 83) Construct the minimized DFA and give the regular expression for the following language ($\sum = \{0,1\}$)

   $$\{w \mid w \text{ contains at least two } 0's \text{ and at most one } 1\}$$

2. (**Hint**: see solution of 1.5(b) pg 84) Construct the minimized DFA and give the regular expression for the following language ($\sum = \{a, b\}$)

   $$\{w \mid w \text{ has an even number of } a's \text{ and one or two } b's\}$$

3. (**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=$\{ w \mid w \in A \text{ but } w \text{ is not a proper prefix of any string in } A \}$

   If $M = (Q, \Sigma, \delta, q_0, F)$ is the DFA recognizing A, construct the DFA M' that will recognize B.

4. (**Hint**: see solution of 1.5(b) pg 84) Construct the minimized DFA and give the regular expression for the following language ($\sum = \{a, b\}$)

   $$\{w \mid w \text{ is any string not in } (ab^+)^*\}$$

5. Use pumping lemma to show that the following language is not regular

   $\{ 0^m 1^n 0^m \mid m, n \geq 0\}$

6. (**Hint**: Describe D more simply first) Let,

   $D =$

   $\{w \mid \text{contains an even number of } a's \text{ and an odd number of } b's \text{ and does not contain the substring } ab\}$

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