(For Group 2)

1. (**Hint**: see solution of 1.4(b) pg 84) Construct the minimized DFA and give the regular expression for the following language
$$\{w \mid w \text{ is any string not in } a^* \cup b^*\}$$

2. (**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=$\{ w \mid w \epsilon A \text{ but } w \text{ is not a proper prefix of any string in } A \}$
If $M = (Q, \Sigma, \delta, q_0, F)$ is the DFA recognizing A, construct the DFA M' that will recognize B.

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

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

5. (**Hint**: First find a 4-state NFA for the complement of F) Let,
$D =$
$\{w \mid w \text{ does not contain a pair of } 1's \text{ that are separated by an odd number of symbols}\}$

($\sum = \{0,1\}$). Give a DFA with **five states** that recognizes D and a regular expression that generates D.

6. Use pumping lemma to show that the following language is not regular
$\{ wtw \mid w, t \in \{0,1\}^+\}$