(For Group 4)

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

$$\{w \mid every\ odd\ position\ of\ w\ is\ a\ 1\}$$

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

$$\{w \mid w\ has\ even\ length\ and\ an\ odd\ number\ of\ a's\}$$

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

$$\{w \mid w\ is\ any\ string\ not\ in\ a^*b^*\}$$

4. (**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.

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

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

6. Use pumping lemma to show that the following language is not regular
   $\{\ 0^m 1^n \mid m \neq n, \quad m, n\ \geq 0\}$