On homework, you may discuss with other students in the course about how to solve a problem, but the write-up should be your own. You must include the names of any students you consulted with. Give credit where credit is due.

1. (8 pts) Prove the following languages are not regular by using the pumping lemma. Show all steps.
   
   (a) \( L = \{w w^R \mid w \in \Sigma^*\}, \Sigma = \{a, b\} \)
   
   (b) \( L = \{a^n b^m a^p \mid p > n + m, p, n, m > 0\}, \Sigma = \{a, b\} \)

2. (8 pts) Prove the following languages are not regular by using closure properties. Show all steps.
   
   (a) \( L = \{w w^R \mid w \in \Sigma^*\}, \Sigma = \{a, b\} \)
   
   (b) \( L = \{a^n b^m a^p \mid p = n + m, p, n, m > 0\}, \Sigma = \{a, b\} \)

3. (4 pts) Convert the following DFA into a DFA with the fewest number of states using the algorithm discussed in class. Show the tree distinguishing the states and explain at each level the reason for distinguishing the states. Show the resulting minimal DFA (by showing the transition diagram). You can use JFLAP to check your answer.

4. (4 pts) Convert the following DFA into a DFA with the fewest number of states using the algorithm discussed in class. Show the tree distinguishing the states and explain at each level the reason for distinguishing the states. Show the resulting minimal DFA (by showing the transition diagram). You can use JFLAP to check your answer.