1. Find an NFA that accepts the language $L(aa^*(ab+b))$.

2. Convert the above NFA to an equivalent DFA using the procedure NFA-TO-DFA

3. Find an NFA that accepts the language $L(aa^*(a+b))$.

4. Convert the above NFA to an equivalent DFA using the procedure NFA-TO-DFA

5. Find a regular expression for the language \{a^n b^m : (n + m) is odd\}

6. Give a regular expression for $L = \{a^n b^m : n \geq 3, m \geq 4\}$ and a regular expression for $\overline{L}$.

7. Find a regular expression for $L = \{w \in \{0,1\}^* : w$ has exactly one pair of consecutive zeros\}.

8. Find a regular expression to denote all bit strings whose value, when interpreted as an unsigned binary integer is a power of 2.

9. Let $\equiv$ denote equivalence among regular expressions as: $r_1 \equiv r_2$ iff $L(r_1) = L(r_2)$. Prove or disprove the following:
   
   (a) $(r_1^*)^* \equiv r_1^*$
   
   (b) $r_1^*(r_1 + r_2) \equiv (r_1 + r_2)^*$
   
   (c) $r_1^*(r_1 + r_2)^* \equiv (r_1 + r_2)^*$
   
   (d) $(r_1 + r_2)^* \equiv (r_1^* r_2^*)^*$

10. Give a general method to convert a regular expression $r$ into $\hat{r}$ such that $L(\hat{r}) = (L(r))^R$. 