1. Write a regular expression for the language consisting of all strings over \{a, b\} which contain the substring \textit{aaa}.

2. Use the method given on page 86 of the sixth edition of Linz, or on page 89 of the fifth edition, to find a regular expression equivalent to the following NFA.

\[
\begin{array}{c}
\text{a+b} \\
\text{0} \\
\text{a} \\
\text{a+b} \\
\text{1} \\
\text{a+b} \\
\text{2} \\
\text{3} \\
\end{array}
\]
3. The following DFA accepts the language consisting of all binary numerals for positive multiples of three, where a leading 0 is allowed. Use the method given on page 86 of the sixth edition of Linz, or on page 89 of the fifth edition, to find an equivalent regular expression.

![DFA Diagram]

4. (a) State the pumping lemma for regular languages.
(b) Use the pumping lemma to prove that the language \( L = \{a^n b^n : n \geq 0 \} \) is not regular.
5. Work problem 9(a) on page 138 of the sixth edition, which is problem 7(a) on page 137 of the fifth edition.

6. Work problem 9(c) on page 138 of the sixth edition, which is problem 7(c) on page 137 of the fifth edition.