1. DFA in Figure 2.1 accepts all mentioned strings (0001, 01101, 00001101).

2. Assuming $\Sigma = \{a\}$, the language described by Figure 2.8 is $L = \{a^3\} \cup \{a^{3n} \mid n \geq 1\}$.

The complement of a language is defined as $\overline{L} = \Sigma^* - L$, therefore $\overline{L} = \{\lambda, a, a^5, a^7, a^9, \ldots\}$. The corresponding DFA is drawn below.

3. The resulting DFA from NFA is shown below.
4. \( G = (V, T, S, P) \) is the grammar for \( L = L(G) \). New grammar \( G' = (V', T, S', P') \) represents \( L' = L\Sigma^* \).

Assuming \( S' \) and \( N \) is not in \( V \) and \( T = \{t_1, t_2, t_3, \ldots, t_n\} \), we can write two new rules.

\[
S' \rightarrow SN \\
N \rightarrow t_1 N \mid t_2 N \mid \ldots \mid t_n N \mid \lambda
\]

With these two rules, \( S' \) produces any word of \( L \) concatenated with any word of \( \Sigma^* \). The new grammar is \( G' = (V', T, S', P') \) where \( V' = V \cup \{S', N\} \) and \( P' = P \cup \{S' \rightarrow SN, N \rightarrow \ldots\} \) (the two new rules are added to rules in \( P \)).

5. (a) \( L_1 = \emptyset \), \( L_2 = \{\lambda\} \), \( L_3 = \{a\} \), \( L_4 = (b|ab)^*(a|\lambda) \)

(b) DFA for \( L_1 \):

DFA for \( L_2 \):

DFA for \( L_3 \):

DFA for \( L_4 \):
6. \(L_1 = \Sigma^*, L_2 = a^*b\Sigma^*, L_3 = a^*b^* = \{a^n b^m \mid n, m \geq 0\}\)

7. (a) The DFA that accepts \(L_1 = \Sigma^*, L_2 = a^*b\Sigma^*, L_3 = a^*b^* = \{a^n b^m \mid n, m \geq 0\}\):

\[
\begin{array}{c}
\text{start} \quad q_0 \\
0 \quad q_1 \\
1 \quad q_2 \\
0,1 \\
\end{array}
\]

(b) \(M = (Q, \Sigma, \delta, q_0, F)\) where \(Q = \{q_0, q_1, q_2\}\), \(\Sigma = \{0, 1\}\), \(F = \{q_0, q_1\}\)

\[
\delta(q, l) = \begin{cases} 
q_0 & \text{if } (q, l) = (q_0, 1) \lor (q, l) = (q_1, 1) \\
q_1 & \text{if } (q, l) = (q_0, 0) \\
q_2 & \text{otherwise}
\end{cases}
\]

8. (a) The DFA that accepts \(L_1 = \{abab\}\) assuming \(\Sigma = \{a, b\}\):

\[
\begin{array}{c}
\text{start} \quad q_0 \\
a \quad q_1 \quad b \\
a \quad b \quad a \quad b \\
q_7 \\
b \quad a, b \\
q_6 \\
b \quad a, b \\
q_7 \\
\end{array}
\]

(b) The DFA that accepts \(L_2 = \{aba, abh, baa\}\) assuming \(\Sigma = \{a, b\}\):

\[
\begin{array}{c}
\text{start} \quad q_0 \\
a \quad q_1 \\
b \quad q_2 \\
q_3 \\
q_4 \\
q_5 \\
q_6 \\
\end{array}
\]

9. We need to show \(L\) has a corresponding DFA to show that \(L\) is regular.
10. (a) The NFA for language $L = \{w \in \Sigma^+ \mid w > 4\}$:

(b) The NFA for language $L = \{w \in \Sigma^+ \mid w \text{ is a power of 2}\}$:
   (Assuming 1 is a power of 2)

(c) The NFA for language $L = \{w \in \Sigma^+ \mid w \text{ is even}\}$: