1. Give DFAs that recognize the following languages

(a) \( \{w \in \{0,1\}^* | w \) starts with a 1 and has even length\}. 

Solution:

\[
\begin{array}{c}
q \\
\downarrow \\
r \\
\downarrow \\
0 \\
\downarrow \\
t \\
\downarrow \\
0,1 \\
\end{array}
\quad
\begin{array}{c}
r \\
\downarrow \\
0,1 \\
\end{array}
\quad
\begin{array}{c}
s \\
\downarrow \\
0,1 \\
\end{array}
\]

(b) \( \{w \in \{0,1\}^* | w \) ends with 011\}.

Solution:

\[
\begin{array}{c}
q \\
\downarrow \\
r \\
\downarrow \\
0 \\
\downarrow \\
s \\
\downarrow \\
0 \\
\end{array}
\quad
\begin{array}{c}
r \\
\downarrow \\
1 \\
\end{array}
\quad
\begin{array}{c}
s \\
\downarrow \\
1 \\
\end{array}
\quad
\begin{array}{c}
t \\
\end{array}
\]
2. Using the complementation construction and one of the DFAs from Exercise 1, give a DFA that recognizes the language

\[ \{ w \in \{0, 1\}^* | w \text{ does not end with } 011 \} \]

Solution: