When page numbers are given, the problems are in the Kozen book.

1. [20 points] Page 326, exercise 50a.

2. [20 points] Depict the abstract states and transitions of the non-regular language \( \{ x 0 x \mid x \in \{1\}^* \} \). (This is a carry-over from assignment 2. If you submitted it then, you don’t have to re-do it. Just make a note on your submission for this assignment.)


4. [20 points] Page 304, exercise 2b. Exemplify the construction in your answer by deriving from it an NFA for the language in part a.

5. [20 points] Page 325, exercise 37g.

6. [20 points] Derive a DFA for the language generated by the following grammar over terminal alphabet \{a, b\}, where S is the start symbol:

\[
\begin{align*}
S & \rightarrow A \\
S & \rightarrow a \\
A & \rightarrow aA \\
A & \rightarrow bB \\
B & \rightarrow aC \\
B & \rightarrow bA \\
B & \rightarrow bB \\
C & \rightarrow aA \\
C & \rightarrow \epsilon
\end{align*}
\]