Lexical Analysis

Exercise 1

For the given regular expression:
\[ a \ast (bc \mid d)\ast \]

1. draw NFA (Non-deterministic Finite Automaton).

2. transform NFA to DFA (Deterministic Finite Automaton).

Exercise 2

Explain why there are no regular expressions which can express the language \( a^n b^m \) where \( n = m \). This means language over the alphabet \( a, b \) where there is the same number of \( a \)'s as \( b \)'s.

Exercise 3

Write a regular expression that matches:
\texttt{car, bar, jar, star, crocodile}

But does not match:
\texttt{har, far, mar, rawr}

Try to optimize.

Exercise 4

Write a regular expression for an integer number of time units (take into account only milliseconds, seconds, minutes, hours and days).
Examples:
\begin{itemize}
\item 256ms
\item 5s
\item 32m
\item 16h
\item 4d
\end{itemize}