Homework 4

CSC 445-01: Theory of Computation

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2.1 (a)-(d)

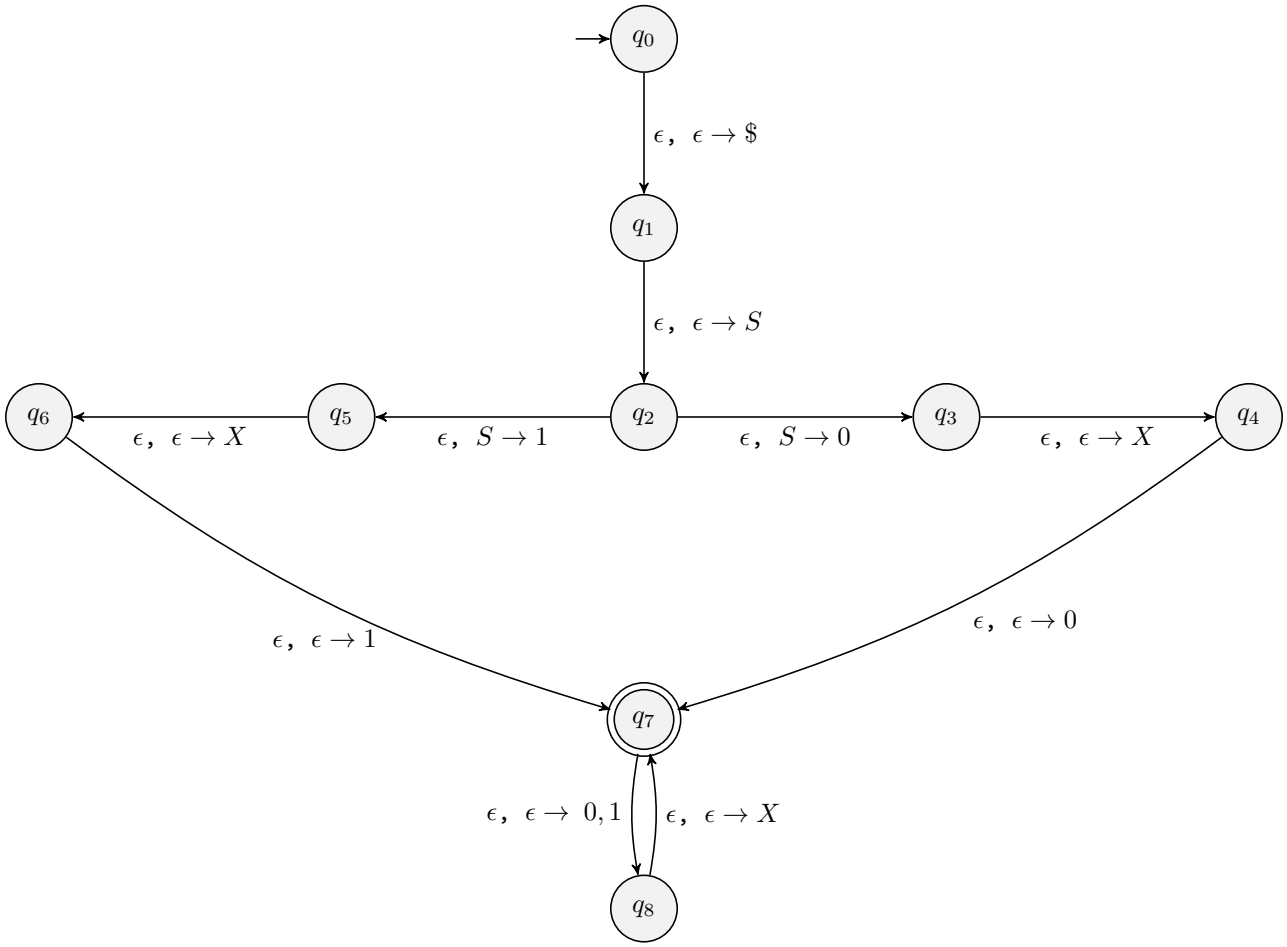
2.4 (b)

To generate the language of words w such that w starts and ends with the same symbol using $\Sigma = \{0, 1\}$, we give the context-free grammar:

$$\begin{aligned} S &\rightarrow 0X0 \mid 1X1 \\ X &\rightarrow 0X \mid 1X \mid \epsilon \end{aligned}$$

2.5 (b)

$V = \{S, X\}$ and $\Sigma = \{\epsilon, 0, 1\}$



2.5 (e)

2.6 (b)

The CFG that generates the complement for the language $A = \{a^n b^n \mid n \geq 0\}$ is such:

$$S \rightarrow a \mid b \mid aAbBaX$$

$$X \rightarrow aX \mid bX \mid \epsilon$$

$$A \rightarrow aA \mid \epsilon$$
$$B \rightarrow bB \mid \epsilon$$

2.13 (a)