1. Consider the following Turing Machine. Its input alphabet is \{a, b\}. Transitions to the REJECT state are not shown. (“If stuck, reject.”)

(a) Exhibit a non-empty string over \{a, b\} that this TM accepts.

(b) Exhibit a non-empty string over \{a, b\} that this TM does not accept.
(c) What language does this TM accept? (You should characterize it in terms of properties of the accepted strings.)

2. Exhibit a derivation of the string $a^2b^4c^2$ in the following grammar:

\[
\begin{align*}
S & \rightarrow SABBC \mid X \\
CB & \rightarrow BC \\
CA & \rightarrow AC \\
BA & \rightarrow AB \\
XA & \rightarrow aX \mid aY \\
YB & \rightarrow bY \mid bZ \\
ZC & \rightarrow cZ \mid c
\end{align*}
\]

What language does this grammar generate?