Exercise 1: LTL
Consider the following transition system over the set of atomic propositions \{a, b\}:

\[
\begin{align*}
& \quad s_4 \{b\} \\
& \quad \{a\} \quad s_1 \quad \{a\} \\
& \quad \quad s_2 \quad s_3 \quad \{a, b\}
\end{align*}
\]

Indicate for each of the following LTL-formulae the set of states for which the formula is fulfilled:

(a) $\Box a$
(b) $\Box \Box \Box a$
(c) $\Box b$
(d) $\Box \Diamond a$
(e) $\Box (b \lor a)$
(f) $\Diamond (a \lor b)$

Exercise 2: Stating Properties in LTL
Consider a lift system that services $N$ floors numbered 0 through $N - 1$. Assume $door(i)$ indicates that the doors on the $i$-th floor are open, $lift(i)$ indicates that the lift is at floor $i$, and $req(i)$ indicates that the request button at floor $i$ was pressed and is lit. In the lift cabin there are $N$ buttons for the floors and $send(i)$ indicates that the $i$-th send button is lit.

State the following properties in LTL.

(a) A floor door is never open if the cabin is not present at that floor.
(b) A requested floor will be served sometime.
(c) The lift returns to floor 0 infinitely often.
(d) The lift does not move unless there is some request.