Specification and Verification II

The multiplexer \texttt{MUX}, register \texttt{REG} \textit{c} (where \textit{c} is the initial value) and combinational unit \texttt{COM} \textit{f} (where \textit{f} is the function computed) are defined to have the behaviour given below.

\begin{align*}
\text{MUX}(sw,i1,i2,o) &= \forall t. o(t) = \text{if } sw(t) \text{ then } i1(t) \text{ else } i2(t) \\
\text{REG} \text{ } c \text{ } (i,o) &= (o(0) = c) \land \forall t. o(t+1) = i(t) \\
\text{COM} \text{ } f \text{ } (i,o) &= \forall t. o(t) = f(i(t))
\end{align*}

Using only instances of \texttt{MUX}, \texttt{REG} \textit{c} and \texttt{COM} \textit{f} design a device \texttt{DEV(c,f)} that satisfies

\begin{align*}
\text{DEV}(c,f)(\text{reset},i,o) &= \\
&= (o(0) = c) \land \forall t. o(t+1) = \text{if reset}(t+1) \text{ then } c \text{ else } f(o(t))
\end{align*}

[8 marks]

Prove that your design meets this specification. [12 marks]