8.1 (a) The nodes are:

$$\begin{aligned}
\mathcal{P}_3 &= \{\{\text{uuu}\}, \{\text{uud}, \text{udu}, \text{duu}\}, \{\text{udd}, \text{dud}, \text{ddu}\}, \{\text{ddd}\}\} \\
\mathcal{P}_2 &= \{\{\text{uuu}, \text{uud}\}, \{\text{udu}, \text{udd}, \text{duu}, \text{dud}\}, \{\text{ddu}, \text{ddd}\}\} \\
\mathcal{P}_1 &= \{\{\text{uuu}, \text{uud}, \text{udu}, \text{udd}\}, \{\text{duu}, \text{dud}, \text{ddu}, \text{ddd}\}\} \\
\mathcal{P}_0 &= \{\{\text{uuu}, \text{uud}, \text{udu}, \text{udd}, \text{duu}, \text{dud}, \text{ddu}, \text{ddd}\}\}.
\end{aligned}$$

(b) No. The nodes on the recombining tree 'forget' the past, they only tell us what the current stock price is. Mathematically we have

$$\begin{aligned}
\mathcal{F}_1 &= \{\emptyset, \{\text{uuu}, \text{uud}, \text{udu}, \text{udd}\}, \{\text{duu}, \text{dud}, \text{ddu}, \text{ddd}\}, \Omega\} \\
\mathcal{F}_2 &= \{\emptyset, \{\text{uuu}, \text{uud}\}, \{\text{udu}, \text{udd}, \text{duu}, \text{dud}\}, \{\text{ddu}, \text{ddd}\}, \\
&\quad \{\text{uuu}, \text{uud}, \text{udu}, \text{udd}, \text{duu}, \text{dud}\}, \{\text{uuu}, \text{uud}, \text{ddu}, \text{ddd}\}, \\
&\quad \{\text{udu}, \text{udd}, \text{duu}, \text{dud}, \text{ddu}, \text{ddd}\}, \Omega\} \\
\Omega &= \{\text{uuu}, \text{uud}, \text{udu}, \text{udd}, \text{duu}, \text{dud}, \text{ddu}, \text{ddd}\},
\end{aligned}$$

and it is clear that $\mathcal{F}_1 \not\subset \mathcal{F}_2$, because, for example, $\{\omega_1, \omega_2, \omega_3, \omega_4\}$ is in $\mathcal{F}_1$ but it does not belong to $\mathcal{F}_2$. Consequently, the collection of algebras $\mathcal{F}_0, \mathcal{F}_1, \mathcal{F}_2, \mathcal{F}_3$ is not an information filtration.