

$$\begin{aligned}
\mathbf{F} \varphi &= \textit{true} \mathbf{U} \varphi \\
&\stackrel{\text{dsc}}{=} \textit{true} \mathbf{U} (\varphi \wedge (\textit{true} \vee \textit{sing})) \\
&= \textit{true} \mathbf{U} \varphi \\
&\stackrel{\text{t}}{=} \textit{true} \mathbf{U} (\varphi \wedge \textit{alive}) \\
&= \mathbf{F} (\boxed{\varphi} \wedge \textit{alive})
\end{aligned}$$