

$$\begin{aligned}
\mathbf{f}(a^*, b) &= \top \wedge \mathbf{f}(a^*, b) \\
&= \text{id}_A(a^*, a) \wedge \mathbf{f}(a^*, b) \\
&\leq \bigvee_{a' \in A} \text{id}_A(a^*, a') \wedge \mathbf{f}(a'^*, b) \\
&= (\text{id}_A \circ \mathbf{f})(a^*, b).
\end{aligned}$$