

$$\begin{array}{c}
\frac{}{\vdash \textcolor{red}{p}^\perp \Downarrow [\cdot][1 : p]\cdot; \cdot} \text{I} \\
\hline
\vdash [\cdot][1 : p]\cdot; \cdot //^1 \vdash [\cdot][\cdot]p^\perp; \cdot \\
\hline
\vdash [\cdot][1 : p]\cdot; \cdot //^1 \vdash [\cdot][\cdot]\cdot; p^\perp \\
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\vdash \textcolor{red}{!}^1 p^\perp \Downarrow [\cdot][1 : p]\cdot; \cdot \\
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\vdash \textcolor{red}{!}^1 \textcolor{red}{!}^1 p^\perp \Downarrow [\cdot][1 : p]\cdot; \cdot \\
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\end{array}
\begin{array}{c}
4 \\
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4 \\
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\end{array}$$