$$
\begin{array}{lcl}
{\sim}(\phi_1 \vee \phi_2) & \stackrel{\text{def}}{=} & {\sim}\phi_1 \wedge {\sim}\phi_2 \\
{\sim}(\exists x \,.\, \phi_1) & \stackrel{\text{def}}{=} & \forall x \,.\, {\sim}\phi_1
\end{array}
\qquad
\begin{array}{lcl}
{\sim}(\phi_1 \wedge \phi_2) & \stackrel{\text{def}}{=} & {\sim}\phi_1 \vee {\sim}\phi_2 \\
{\sim}(\forall x \,.\, \phi_1) & \stackrel{\text{def}}{=} & \exists x \,.\, {\sim}\phi_1 \\
{\sim}q(x_1, \ldots, x_{\#(q)}) & \stackrel{\text{def}}{=} & q(x_1, \ldots, x_{\#(q)})
\end{array}
\qquad
\begin{array}{lcl}
{\sim}(t = s) & \stackrel{\text{def}}{=} & t \neq s \\
{\sim}(t \neq s) & \stackrel{\text{def}}{=} & t = s
\end{array}
$$