

# de Morgan

/Reference manual/Z-related commands/In situ replacement commands

The *de Morgan* command rewrites logical operations according to de Morgan's rules.

$$\begin{aligned}
 p_1 \wedge p_2 &\implies \neg (\neg p_1 \vee \neg p_2) \\
 e_1 \wedge e_2 &\implies \neg (\neg e_1 \vee \neg e_2) \\
 p_1 \vee p_2 &\implies \neg (\neg p_1 \wedge \neg p_2) \\
 e_1 \vee e_2 &\implies \neg (\neg e_1 \wedge \neg e_2) \\
 p_1 \Rightarrow p_2 &\implies \neg (p_1 \wedge \neg p_2) \\
 e_1 \Rightarrow e_2 &\implies \neg (e_1 \wedge \neg e_2) \\
 \forall s \bullet p &\implies \neg \exists s \bullet \neg p \\
 \forall s \bullet e &\implies \neg \exists s \bullet \neg e \\
 \exists s \bullet p &\implies \neg \forall s \bullet \neg p \\
 \exists s \bullet e &\implies \neg \forall s \bullet \neg e
 \end{aligned}$$

## 1. Tactic example

*“de Morgan” p e*

This example applies the *de Morgan* command to predicate  $p$  and expression  $e$ .

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