

commutation

[/Reference manual/Z-related commands/In situ replacement commands](#)

The *commutation* command swaps the operands of commutative operators. There are two categories of commutations: elementary ones that are built-in to cadiz, and ones that are coded explicitly as Z rewrite rules. An example of the latter is as follows.

union_commutation ==

$$[X] \vdash? \forall S, T : \mathbb{P} X \bullet S \cup T = T \cup S$$

The form of a rewrite rule must be as specified in [rewrite by rule](#), and moreover its name must have *commutation* as a sub-string. The effect of a rewrite rule is also explained in [rewrite by rule](#).

The built-in elementary commutations are as follows. They take precedence over any matching explicit rewrite rule.

$$\begin{array}{lll}
 e_1 = e_2 & \implies & e_2 = e_1 \\
 p_1 \wedge p_2 & \implies & p_2 \wedge p_1 \\
 e_1 \wedge e_2 & \implies & e_2 \wedge e_1 \\
 p_1 \vee p_2 & \implies & p_2 \vee p_1 \\
 e_1 \vee e_2 & \implies & e_2 \vee e_1 \\
 p_1 \Leftrightarrow p_2 & \implies & p_2 \Leftrightarrow p_1 \\
 e_1 \Leftrightarrow e_2 & \implies & e_2 \Leftrightarrow e_1 \\
 p_1 \underline{\vee} p_2 & \implies & p_2 \underline{\vee} p_1 \\
 e_1 \underline{\vee} e_2 & \implies & e_2 \underline{\vee} e_1
 \end{array}$$

1. Tactic example

“commutation” $p_3 \ p_4$

This example applies the *commutation* command to predicates p_3 and p_4 .

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