

MPL's Max Operator

The MPL *Max* operator satisfies the following properties:

- For a set S of rational numbers, $Max(S)$ returns the maximum value in S .
- $Max(\emptyset) \rightarrow \mathbf{Undefined}$.
- Suppose that S is a finite set of [algebraic expressions](#). The *Max* operator determines the maximum value of the expressions in S that can be compared. Two expressions f and g are *comparable* if $f - g$ is an integer or fraction, and $f > g$ when $f - g > 0$ in automatic simplification. If all the expressions in S are pairwise comparable, the operator returns the maximum expression. If two or more expressions cannot be compared, then the operator returns an unevaluated form of *Max*. For example,

$$\begin{aligned}
 Max(\{a, 2, 3\}) &\rightarrow Max(\{a, 3\}), \\
 Max(\{m, m+1\}) &\rightarrow m+1, \\
 Max(\{3, Max(\{2, x\})\}) &\rightarrow Max(3, x), \\
 Max(\{-5, m, m+1, 2, 3, \sqrt{2}\}) &\rightarrow Max(\{3, m+1, \sqrt{2}\}).
 \end{aligned}$$

Note that in the last example 3 and $\sqrt{2}$ cannot be compared because $3 - \sqrt{2}$ is not an integer or fraction in automatic simplification.

Most computer algebra systems have an operator that is similar to the *Max* operator:

MPL	Maple	Mathematica	MuPAD
$Max(\{n_1, \dots, n_r\})$	$\max(n_1, \dots, n_r)$	$\text{Max}[n_1, \dots, n_r]$	$\max(n_1, \dots, n_r)$

(Implementation: [Maple](#) (mws), [Mathematica](#) (nb), [MuPAD](#) (mnb).)

[Return to Chapter 1, page 14](#)