

## Symbolic calculations in MATHCAD

### Example 1: Factoring and expanding expressions

Enter an expression. Press the space bar until the entire expression is boxed.  
 Select **Symbolics - Expand** or **Symbolics - Factor** to expand or factor the expression.

Boxing  $(x + 1) \cdot (x + 4)$  and then selecting **Symbolics - Expand** yields:  $x^2 + 5 \cdot x + 4$

Boxing  $x^2 + 5 \cdot x + 4$  and then selecting **Symbolics - Factor** yields:  $(x + 1) \cdot (x + 4)$

### Example 2: Evaluating symbolic expressions

Two methods are illustrated below:

1) Using **Symbolics - Evaluate - Symbolically** from the main menu

Boxing  $\int x^2 + 4 dx$

and then selecting **Symbolics - Evaluate - Symbolically** yields:  $\frac{1}{3} \cdot x^3 + 4 \cdot x$

2) Using the evaluate symbol (right arrow found on the Evaluation Palette)

$\int x^2 + 4 dx \Rightarrow \frac{1}{3} \cdot x^3 + 4 \cdot x$       The right arrow can be found using the Evaluation Palette or by pressing **Control + period**.

### Example 3: Simplifying symbolic expressions

Enter an expression. Press the space bar until the entire expression is boxed.  
 Select **Symbolics - Simplify**.

Boxing  $\frac{x}{4} + \frac{19}{20} \cdot x - \frac{27}{31} \cdot x$  and then selecting **Symbolics - Simplify** yields:  $\frac{51}{155} \cdot x$

### Example 4: Solving symbolic equations using a SOLVE BLOCK

There are two main differences from a regular Solve Block:

- 1) Do not use initial guesses.
- 2) Use the symbolic evaluation operator (right arrow) with the Find function.

Given

$$(10 + A) \cdot x + 20 \cdot y = 35$$

$$17 \cdot A + 13 \cdot y = 21$$

$$\text{Find}(x, y) \Rightarrow \left[ \begin{array}{l} \frac{5}{13} \cdot \frac{(68 \cdot A + 7)}{(10 + A)} \\ -\frac{17}{13} \cdot A + \frac{21}{13} \end{array} \right]$$