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Overview

OpenOffice.org has a component (OOo Math) for mathematical equations. OOo Math provides mathematical objects which can be embedded in other OOo documents, or saved on their own.

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The Original Documentation is Math Objects: The Equation Editor. The Initial Writer(s) of the Original Documentation is/are Ian Laurenson © 2004. All Rights Reserved. (Initial Writer contact(s): hillview@paradise.net.nz. The Initial Writer contact(s) is to report errors in the documentation. For questions regarding how to use the software, subscribe to the Users Mail List and post your question there: http://support.openoffice.org/index.html.)

Contributor(s): Daniel Carrera rewrote the explanatory section of the document.

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Feedback

Please direct any comments or suggestions about this document to: authors@user-faq.openoffice.org

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Modifications and updates

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>21 November 2004</td>
<td>First published edition</td>
</tr>
</tbody>
</table>


Introduction

OpenOffice.org (OOo) has a component for mathematical equations. It is most commonly used as an equation editor for text documents, but it can also be used with other types of documents or stand-alone. When used inside Writer, the equation is treated as an object inside the text document.

Important note: The equation editor is for writing equations in symbolic form (as in equation 1). If you want to evaluate a numeric value, this is not the chapter you want. See the Calc guide.

\[
\frac{df(x)}{dx} = \ln(x) + \tan^{-1}(x^2) \tag{1}
\]

Getting started

To insert an equation, go to Insert > Object > Formula.

The equation editor opens at the bottom of the screen, and the floating Selection toolbox appears. You will also see a small box (with a gray border) in your document, where the formula will be displayed.

Figure 1. Writer document showing Equation Editor, Selection toolbar, and location of resulting equation.
The equation editor uses a markup language to represent formulas. For example, “%beta” creates the Greek character beta (β). This markup is designed to read similar to English whenever possible. For example, “a over b” produces a fraction:
\[
\frac{a}{b}
\]

**Entering a Formula**

There are three main ways of entering a formula:

- Type markup in the equation editor.
- Right-click on the equation editor and select the symbol from the context menu.
- Select a symbol from the Selection toolbox.

The context menu and the Selection toolbox insert the markup corresponding to a symbol. Incidentally, this provides a convenient way to learn the OOoMath markup. When you select a symbol from the Selection toolbox, it will show up like this in this equation editor:

\[<?> \text{times} <?>\]

And it will display on screen in Writer like this:

\[\Box \times \Box\]

When you are editing in the equation editor, you need to remove the <?> and replace it with the terms of the equation. For example, “5 times 4” produces \(5 \times 4\). Below is a short list of common equations and their corresponding markup.

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a = b)</td>
<td>a = b</td>
<td>(y \Gamma)</td>
<td>%gamma %GAMMA</td>
</tr>
<tr>
<td>(a^2)</td>
<td>a^2</td>
<td>(a_n)</td>
<td>a_n</td>
</tr>
<tr>
<td>(\int f(x) , dx)</td>
<td>\text{int} f(x) \text{ dx}</td>
<td>(\sum a_n)</td>
<td>\text{sum} \ a_n</td>
</tr>
<tr>
<td>(a \leq b)</td>
<td>a \leq b</td>
<td>(\infty)</td>
<td>\text{infinity}</td>
</tr>
<tr>
<td>(\frac{a}{b})</td>
<td>a over b</td>
<td>(\frac{a}{b})</td>
<td>\text{stack} \ { a \neq b }</td>
</tr>
<tr>
<td>(\sqrt{a})</td>
<td>sqrt {a}</td>
<td>(\vec{a})</td>
<td>\text{vec} \ u</td>
</tr>
<tr>
<td>(x \times y)</td>
<td>x \text{times} y</td>
<td>(x \cdot y)</td>
<td>x \text{cdot} y</td>
</tr>
</tbody>
</table>
Complex Formulas

Of course, most people can figure out how to do something simple like $\sqrt{a}$. The problems appear when you try to write more complex equations. This section explores some general situations and suggests solutions.

**Brackets are your friends**

You may have heard your professor say this. It is true for science, and it is true for OOO. The equation editor knows nothing of order of operation. To make moderately complex formulas, you must use brackets. For example:

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</td>
<td>$x = {-b \pm \sqrt{b^2 - 4ac}} \over {2a}$</td>
</tr>
</tbody>
</table>

*Tip: Squiggly brackets can be used to collect terms without the bracket appearing in the equation.*

**Sums and integration**

The “sum” and “int” commands can optionally take in “from” and “to” parameters. These are used in a way that is meant to resemble how the equation is read in English. These parameters can be used singly or together. For example:

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sum_{n=1}^{\infty} a_n + \frac{1}{n^2}$</td>
<td>$\text{sum from { n = 1 } to infinity { a_n + 1 over n^2}}$</td>
</tr>
<tr>
<td>$\sum_{a \in A} a^3$</td>
<td>$\text{sum from { i in A } { a^3 }}$</td>
</tr>
<tr>
<td>$\int_{a}^{b} x^2 + \frac{1}{x} , dx$</td>
<td>$\text{int from a to b { x^2 + 1 over x } dx}$</td>
</tr>
<tr>
<td>$\int_{\alpha} ! r(\theta)e^{i\theta} , d\theta$</td>
<td>$\text{int from } %alpha { r(%theta)e^{i%theta} , d%theta }$</td>
</tr>
</tbody>
</table>

*Tip: Though they look the same, the “sum” command is more flexible than “%SIGMA”.  
*Tip: Use “infinity” to produce the $\infty$ symbol.*
Matrices

Matrices are done through the matrix command. The basic syntax is:

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ \begin{matrix} a &amp; b \ c &amp; d \end{matrix} ]</td>
<td>[ \text{matrix} { a # b ## c # d } ]</td>
</tr>
</tbody>
</table>

A single “#” symbol is used to separate entries within a given row. Two “#” symbols are used to separate different rows.

One of the first problems people have with matrices is working with brackets. Regular brackets have a fixed size, which doesn't fit well with matrices (see the table below). OOoMath provides “scalable brackets”. These brackets adjust in size (“scale”) to fit the size of their contents. To obtain scalable brackets, use the \texttt{left(} and \texttt{right)} commands.

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ \text{det} \left( \begin{matrix} a &amp; b \ c &amp; d \end{matrix} \right) ]</td>
<td>[ \text{det} \left( \text{matrix} { a # b ## c # d } \right) ]</td>
<td>normal</td>
</tr>
<tr>
<td>[ \text{det} \left[ \begin{matrix} a &amp; b \ c &amp; d \end{matrix} \right] ]</td>
<td>[ \text{det} \left( \text{matrix} { a # b ## c # d } \right) ]</td>
<td>scalable</td>
</tr>
</tbody>
</table>

Tip: Use \texttt{left[} and \texttt{right]} to obtain square brackets.

Derivatives

To write a derivative, or a partial derivative, use the “over” command. That is, treat it as if it were a fraction. For higher-order derivatives, use the ^ symbol, like an exponent.

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ \frac{df(t)}{dt} = \frac{\partial f}{\partial x} \frac{dx}{dt} + \frac{\partial f}{\partial y} \frac{dy}{dt} ]</td>
<td>[ {\text{df(t)}} \over {\text{dt}} = {\text{partial f}} \over {\text{partial x}} {\text{dx}} \over {\text{dt}} + {\text{partial f}} \over {\text{partial y}} {\text{dy}} \over {\text{dt}} ]</td>
</tr>
</tbody>
</table>
Complex layout

Often, the problem is not in writing the equation as such, but obtaining the desired layout. There are some features that can help:

- Adjust alignment with “alignl” (left alignment), “alignr” (right alignment) and “alignc” (centered).
- Use matrices for columned layout.
- Use white space and several lines to make your equation understandable.
- Use ~ or ‘ to produce white space on the equation.

**Tip:** You can insert white space and additional lines in the markup without affecting the output of the equation.

The following example illustrates most of the above.

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
</table>
| $S_n = 1 + r + r^2 + \cdots + r^n$ | matrix {
| $rS_n = r + \cdots + r^n + r^{n+1}$ | $S_n \{=\} \text{alignl } 1 + r + r^2 + \cdots + r^n$  
| $(1-r)S_n = 1 - r^{n+1}$ | $rS_n \{=\} \text{alignl } r + \cdots + r^n + r^{n+1}$  
| $S_n = \frac{1 - r^{n+1}}{1 - r}$ | $(1-r)S_n \{=\} \text{alignl } 1 - r^{n+1}$  
| } |

In addition to matrices, you can also used the `newline` command to move to a new line. Notice (below) that the `newline` command does not have to be on a line of its own.

<table>
<thead>
<tr>
<th>Display</th>
<th>Command</th>
</tr>
</thead>
</table>
| $x + y = 3$  
$x - y = 1$ | $x + y = 3$ newline $x - y = 1$ |
Customizing the interface

There are a few ways to customize the equation editor's interface to make you more productive. Here are some suggestions:

- Show/hide the Selection toolbox with View > Selection.
- Turn off AutoUpdate with View > AutoUpdate display to improve speed. You can still update the formula manually by pressing F9 or through View > Update.
- Turn the editor into a floating window:
  1) Hover the mouse above the border of the equation editor.
  2) Hold down the Control key.
  3) Drag the editor away from the main window.

Numbering equations

Equation numbering is possible and simple. Sadly, this feature is deeply hidden. To insert a formula with a number, follow these steps:

1) Start a new line.
2) Type \( fn \) and then press F3.

You will see a numbered formula appear:

\[ E = mc^2 \] (2)

Then double-click on the formula to edit it. For example, here is the Riemann Zeta function:

\[ \zeta (z) = \sum_{n=1}^{\infty} \frac{1}{n^z} \] (3)

The number in the equation is stored in the form of a field. To refer to an equation by its number (for example, “as shown in Equation (2)”):

1) Insert > Cross-reference.
2) Click on the References tab. (See Figure 2.)
3) Under Type, select Text.
4) Under Selection, pick the equation number.
5) Under Format, choose Reference.
6) Click Insert.
Done! If you later add more equations to the paper before the referenced equation, all the equations will automatically renumber and the cross-references will update.

Figure 2. Inserting a cross-reference to an equation number.
## Unary / binary operators

Table 1. Commands, unary & binary

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>+sign</td>
<td>+1</td>
<td>+ 1</td>
</tr>
<tr>
<td>-sign</td>
<td>-1</td>
<td>− 1</td>
</tr>
<tr>
<td>+/- sign</td>
<td>±-1</td>
<td>± 1</td>
</tr>
<tr>
<td>-/+ sign</td>
<td>neg 1</td>
<td>÷ 1</td>
</tr>
<tr>
<td>Boolean not</td>
<td>neg a</td>
<td>¬ a</td>
</tr>
<tr>
<td>Addition +</td>
<td>a + b</td>
<td>a + b</td>
</tr>
<tr>
<td>Multiplication dot</td>
<td>a cdot b</td>
<td>a ⋅ b</td>
</tr>
<tr>
<td>Multiplication (X)</td>
<td>a times b</td>
<td>a × b</td>
</tr>
<tr>
<td>Multiplication (*)</td>
<td>a * b</td>
<td>a*b</td>
</tr>
<tr>
<td>Boolean and</td>
<td>a and b</td>
<td>a ∧ b</td>
</tr>
<tr>
<td>Subtraction (-)</td>
<td>a - b</td>
<td>a − b</td>
</tr>
<tr>
<td>Division (fraction)</td>
<td>a over b</td>
<td>a/b</td>
</tr>
<tr>
<td>Division (operand)</td>
<td>a div b</td>
<td>a ÷ b</td>
</tr>
<tr>
<td>Division (slash)</td>
<td>a / b</td>
<td>a/b</td>
</tr>
<tr>
<td>Boolean or</td>
<td>a or b</td>
<td>a ∨ b</td>
</tr>
<tr>
<td>Concatenate</td>
<td>a circ b</td>
<td>a ° b</td>
</tr>
</tbody>
</table>
## Relational operators

*Table 2. Commands, relations*

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is equal</td>
<td>( a = b )</td>
<td>( a = b )</td>
</tr>
<tr>
<td>Is not equal</td>
<td>( a \neq b )</td>
<td>( a \neq 2 )</td>
</tr>
<tr>
<td>Approximately</td>
<td>( a \approx 2 )</td>
<td>( a \approx 2 )</td>
</tr>
<tr>
<td>Divides</td>
<td>( a \mid b )</td>
<td>( a \mid b )</td>
</tr>
<tr>
<td>Does not divide</td>
<td>( a \nmid b )</td>
<td>( a \nmid b )</td>
</tr>
<tr>
<td>Less than</td>
<td>( a &lt; 2 )</td>
<td>( a &lt; 2 )</td>
</tr>
<tr>
<td>Greater than</td>
<td>( a &gt; 2 )</td>
<td>( a &gt; 2 )</td>
</tr>
<tr>
<td>Similar to or equal</td>
<td>( a \approx b )</td>
<td>( a \approx b )</td>
</tr>
<tr>
<td>Parallel</td>
<td>( a \parallel b )</td>
<td>( a \parallel b )</td>
</tr>
<tr>
<td>Orthogonal to</td>
<td>( a \perp b )</td>
<td>( a \perp b )</td>
</tr>
<tr>
<td>Less than or equal to</td>
<td>( a \lesssim b )</td>
<td>( a \lesssim b )</td>
</tr>
<tr>
<td>Greater than or equal to</td>
<td>( a \gtrsim b )</td>
<td>( a \gtrsim b )</td>
</tr>
<tr>
<td>Similar to</td>
<td>( a \sim b )</td>
<td>( a \sim b )</td>
</tr>
<tr>
<td>Congruent</td>
<td>( a \equiv b )</td>
<td>( a \equiv b )</td>
</tr>
<tr>
<td>Less than or equal to</td>
<td>( a \leq b )</td>
<td>( a \leq b )</td>
</tr>
<tr>
<td>Greater than or equal to</td>
<td>( a \geq b )</td>
<td>( a \geq b )</td>
</tr>
<tr>
<td>Proportional</td>
<td>( a \propto b )</td>
<td>( a \propto b )</td>
</tr>
<tr>
<td>Toward</td>
<td>( a \rightarrow b )</td>
<td>( a \rightarrow b )</td>
</tr>
<tr>
<td>Arrow left</td>
<td>( a \leftarrow b )</td>
<td>( a \leftarrow b )</td>
</tr>
<tr>
<td>Double arrow left and right</td>
<td>( a \leftrightarrow b )</td>
<td>( a \leftrightarrow b )</td>
</tr>
<tr>
<td>Arrow right</td>
<td>( a \Rightarrow b )</td>
<td>( a \Rightarrow b )</td>
</tr>
</tbody>
</table>
## Set operations

*Table 3. Commands, set operators*

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is in</td>
<td>a in B</td>
<td>(a \in B)</td>
</tr>
<tr>
<td>Is not in</td>
<td>a notin B</td>
<td>(a \notin B)</td>
</tr>
<tr>
<td>Owens</td>
<td>A owns b</td>
<td>(A \owns b)</td>
</tr>
<tr>
<td>Empty set</td>
<td>emptyset</td>
<td>(\emptyset)</td>
</tr>
<tr>
<td>Intersection</td>
<td>A intersection B</td>
<td>(A \cap B)</td>
</tr>
<tr>
<td>Union</td>
<td>A union B</td>
<td>(A \cup B)</td>
</tr>
<tr>
<td>Difference</td>
<td>A setminus B</td>
<td>(A \setminus B)</td>
</tr>
<tr>
<td>Quotient</td>
<td>A slash B</td>
<td>(A / B)</td>
</tr>
<tr>
<td>Aleph</td>
<td>aleph</td>
<td>(\aleph)</td>
</tr>
<tr>
<td>Subset</td>
<td>A subset B</td>
<td>(A \subset B)</td>
</tr>
<tr>
<td>Subset or equal to</td>
<td>A subseteq B</td>
<td>(A \subseteq B)</td>
</tr>
<tr>
<td>Superset</td>
<td>A supset B</td>
<td>(A \supset B)</td>
</tr>
<tr>
<td>Superset or equal to</td>
<td>A supseteq B</td>
<td>(A \supseteq B)</td>
</tr>
<tr>
<td>Not subset</td>
<td>A nssubset B</td>
<td>(A \not\subset B)</td>
</tr>
<tr>
<td>Not subset or equal</td>
<td>A nssubseteq B</td>
<td>(A \not\subseteq B)</td>
</tr>
<tr>
<td>Not superset</td>
<td>A nsupset B</td>
<td>(A \not\supset B)</td>
</tr>
<tr>
<td>Not Superset or equal</td>
<td>A nsupseteq B</td>
<td>(A \not\supseteq B)</td>
</tr>
<tr>
<td>Natural Numbers Set</td>
<td>setN</td>
<td>(\mathbb{N})</td>
</tr>
<tr>
<td>Set of Integers</td>
<td>setZ</td>
<td>(\mathbb{Z})</td>
</tr>
<tr>
<td>Set of rational numbers</td>
<td>setQ</td>
<td>(\mathbb{Q})</td>
</tr>
<tr>
<td>Set of real numbers</td>
<td>setR</td>
<td>(\mathbb{R})</td>
</tr>
<tr>
<td>Set of complex numbers</td>
<td>setC</td>
<td>(\mathbb{C})</td>
</tr>
</tbody>
</table>
# Functions

*Table 4. Commands, function*

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exponential</td>
<td><code>func e^{a}</code></td>
<td>e&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Natural logarithm</td>
<td><code>ln(a)</code></td>
<td>ln&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Exponential function</td>
<td><code>exp(a)</code></td>
<td>exp&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Logarithm</td>
<td><code>log(a)</code></td>
<td>log&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Power</td>
<td><code>a^b</code></td>
<td>a&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Sine</td>
<td><code>sin(a)</code></td>
<td>sin&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Cosine</td>
<td><code>cos(a)</code></td>
<td>cos&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Tangent</td>
<td><code>tan(a)</code></td>
<td>tan&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Cotangent</td>
<td><code>cot(a)</code></td>
<td>cot&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Square root</td>
<td><code>sqrt{a}</code></td>
<td>√a</td>
</tr>
<tr>
<td>Arcsine</td>
<td><code>arcsin(a)</code></td>
<td>arcsin&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Arc cosine</td>
<td><code>arccos(a)</code></td>
<td>arccos&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Arctangent</td>
<td><code>arctan(a)</code></td>
<td>arctan&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Arc cotangent</td>
<td><code>arccot(a)</code></td>
<td>arccot&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>n&lt;sup&gt;th&lt;/sup&gt; root</td>
<td><code>nroot{a}{b}</code></td>
<td>a&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hyperbolic sine</td>
<td><code>sinh(a)</code></td>
<td>sinh&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Hyperbolic cosine</td>
<td><code>cosh(a)</code></td>
<td>cosh&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Hyperbolic tangent</td>
<td><code>tanh(a)</code></td>
<td>tanh&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Hyperbolic cotangent</td>
<td><code>coth(a)</code></td>
<td>coth&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Absolute value</td>
<td><code>abs{a}</code></td>
<td></td>
</tr>
<tr>
<td>Arc hyperbolic sine</td>
<td><code>arsinh(a)</code></td>
<td>arsinh&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Arc hyperbolic cosine</td>
<td><code>arcosh(a)</code></td>
<td>arccosh&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Arc hyperbolic tangent</td>
<td><code>artanh(a)</code></td>
<td>artanh&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Arc hyperbolic cotangent</td>
<td><code>arcoth(a)</code></td>
<td>arcoth&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Factorial</td>
<td><code>fact(a)</code></td>
<td>a!</td>
</tr>
</tbody>
</table>
Operators

All operators can be used with the limit functions (“from” and “to”)

Table 5. Commands, operators

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td>lim(a)</td>
<td>$\lim a$</td>
</tr>
<tr>
<td>Sum</td>
<td>sum(a)</td>
<td>$\sum a$</td>
</tr>
<tr>
<td>Product</td>
<td>prod(a)</td>
<td>$\prod a$</td>
</tr>
<tr>
<td>Coproduct</td>
<td>coprod(a)</td>
<td>$\coprod a$</td>
</tr>
<tr>
<td>Limits from and to (shown with integral)</td>
<td>int from ${r_0}$ to ${r_t}$ a</td>
<td>$\int_{r_0}^{r_t} a$</td>
</tr>
<tr>
<td>Intigral</td>
<td>int{a}</td>
<td>$\int a$</td>
</tr>
<tr>
<td>Double intigral</td>
<td>iiint{a}</td>
<td>$\iiint a$</td>
</tr>
<tr>
<td>Tripple Intigral</td>
<td>iiint{a}</td>
<td>$\iiint a$</td>
</tr>
<tr>
<td>Lower limit shown with summation symbol</td>
<td>sum from ${3}$b</td>
<td>$\sum_{3} b$</td>
</tr>
<tr>
<td>Curved intigeral</td>
<td>lint a</td>
<td>$\oint a$</td>
</tr>
<tr>
<td>Double curved intigeral</td>
<td>llint a</td>
<td>$\llint a$</td>
</tr>
<tr>
<td>Tripple curved intigeral</td>
<td>llint a</td>
<td>$\llint a$</td>
</tr>
<tr>
<td>Upper limit shown with product symbol</td>
<td>prod to ${3}$ r</td>
<td>$\prod_{3} r$</td>
</tr>
</tbody>
</table>
# Attributes

### Table 6. Attributes

<table>
<thead>
<tr>
<th><strong>Operation</strong></th>
<th><strong>Command</strong></th>
<th><strong>Display</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute accent</td>
<td>acute a</td>
<td>à</td>
</tr>
<tr>
<td>Grave accent</td>
<td>grave a</td>
<td>à</td>
</tr>
<tr>
<td>Reverse circumflex</td>
<td>check a</td>
<td>à</td>
</tr>
<tr>
<td>Breve</td>
<td>breve a</td>
<td>ã</td>
</tr>
<tr>
<td>Circle</td>
<td>circle a</td>
<td>å</td>
</tr>
<tr>
<td>Vector arrow</td>
<td>vec a</td>
<td>ã</td>
</tr>
<tr>
<td>Tilde</td>
<td>tilde a</td>
<td>ã</td>
</tr>
<tr>
<td>Circumflex</td>
<td>hat a</td>
<td>à</td>
</tr>
<tr>
<td>Line above</td>
<td>bar a</td>
<td>å</td>
</tr>
<tr>
<td>Dot</td>
<td>dot a</td>
<td>å</td>
</tr>
<tr>
<td>Wide vector arrow</td>
<td>widevec abc</td>
<td>abc</td>
</tr>
<tr>
<td>Wide tilde</td>
<td>widetilde abc</td>
<td>abc</td>
</tr>
<tr>
<td>Wide circumflex</td>
<td>widehat abc</td>
<td>abc</td>
</tr>
<tr>
<td>Double dot</td>
<td>ddot</td>
<td>å</td>
</tr>
<tr>
<td>Line over</td>
<td>overline abc</td>
<td>abc</td>
</tr>
<tr>
<td>Line under</td>
<td>underline abc</td>
<td>abc</td>
</tr>
<tr>
<td>Line through</td>
<td>overstrike acb</td>
<td>abc</td>
</tr>
<tr>
<td>Ripple dot</td>
<td>dddot a</td>
<td>å</td>
</tr>
<tr>
<td>Transparent (useful to get a placeholder of a given size)</td>
<td>phantom a</td>
<td></td>
</tr>
<tr>
<td>Bold font</td>
<td>bold a</td>
<td>a</td>
</tr>
<tr>
<td>Italic font¹</td>
<td>ital a</td>
<td>a</td>
</tr>
<tr>
<td>Resize font</td>
<td>size 16 qv</td>
<td>qv</td>
</tr>
<tr>
<td>Following item in sans serif font²</td>
<td>font sans qv</td>
<td>qv</td>
</tr>
<tr>
<td>Following item in serif font</td>
<td>font serif qv</td>
<td>qv</td>
</tr>
<tr>
<td>Following item in fixed font</td>
<td>font fixed qv</td>
<td>qv</td>
</tr>
</tbody>
</table>

1. Unquoted text that isn't a command is considered to be a variable. Variables are, by default, italicized.

2. There are three custom fonts: sans serif (without kicks), serifs (with kicks), and fixed (non proportional). To change the actual fonts used for custom fonts and the fonts used for variables (unquoted text), numbers and functions, use: **Format > Fonts**.
<table>
<thead>
<tr>
<th><strong>Operation</strong></th>
<th><strong>Command</strong></th>
<th><strong>Display</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Make color of following text cyan</td>
<td><code>color cyan qv</code></td>
<td><code>qv</code></td>
</tr>
<tr>
<td>Make color of following text yellow</td>
<td><code>color yellow qv</code></td>
<td><code>qv</code></td>
</tr>
<tr>
<td>Make color of following text green</td>
<td><code>color white qv</code></td>
<td><code>qv</code></td>
</tr>
<tr>
<td>Make color of following text white</td>
<td><code>color green qv</code></td>
<td><code>qv</code></td>
</tr>
<tr>
<td>Make color of following text blue</td>
<td><code>color blue qv</code></td>
<td><code>qv</code></td>
</tr>
<tr>
<td>Make color of following text red</td>
<td><code>color red qv</code></td>
<td><code>qv</code></td>
</tr>
<tr>
<td>Make color green returns to default color black</td>
<td><code>color green X qv</code></td>
<td><code>X qv</code></td>
</tr>
<tr>
<td>Brace items to change color of more than one item</td>
<td><code>color green {X qv}</code></td>
<td><code>X qv</code></td>
</tr>
</tbody>
</table>
## Others

*Table 7. Commands, others*

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infinity</td>
<td>infinity</td>
<td>$\infty$</td>
</tr>
<tr>
<td>Partial</td>
<td>partial</td>
<td>$\partial$</td>
</tr>
<tr>
<td>Nabla</td>
<td>nabla</td>
<td>$\nabla$</td>
</tr>
<tr>
<td>There exists</td>
<td>exists</td>
<td>$\exists$</td>
</tr>
<tr>
<td>For all</td>
<td>forall</td>
<td>$\forall$</td>
</tr>
<tr>
<td>H bar</td>
<td>hbar</td>
<td>$\hbar$</td>
</tr>
<tr>
<td>Lambda bar</td>
<td>lambdabar</td>
<td>$\lambda$</td>
</tr>
<tr>
<td>Real part</td>
<td>re</td>
<td>$\Re$</td>
</tr>
<tr>
<td>Imaginary part</td>
<td>im</td>
<td>$\Im$</td>
</tr>
<tr>
<td>Weierstrss $p$</td>
<td>wp</td>
<td>$\wp$</td>
</tr>
<tr>
<td>Left arrow</td>
<td>leftrightarrow</td>
<td>$\leftarrow$</td>
</tr>
<tr>
<td>Right arrow</td>
<td>rightrightarrow</td>
<td>$\rightarrow$</td>
</tr>
<tr>
<td>Up arrow</td>
<td>uparrow</td>
<td>$\uparrow$</td>
</tr>
<tr>
<td>Down arrow</td>
<td>downarrow</td>
<td>$\downarrow$</td>
</tr>
<tr>
<td>Dots at bottom</td>
<td>dotslow</td>
<td>$\ldots$</td>
</tr>
<tr>
<td>Dots at middle</td>
<td>dotsaxis</td>
<td>$\ldots$</td>
</tr>
<tr>
<td>Dots vertical</td>
<td>dotsvert</td>
<td>$\vdots$</td>
</tr>
<tr>
<td>Dots diagonal upward</td>
<td>dotsup</td>
<td>$\ddots$</td>
</tr>
<tr>
<td>Dots diagonal downward</td>
<td>dotsdown</td>
<td>$\ddots$</td>
</tr>
</tbody>
</table>
## Brackets

**Table 8. Commands, braces**

<table>
<thead>
<tr>
<th><strong>Operation</strong></th>
<th><strong>Command</strong></th>
<th><strong>Display</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Round Brackets</td>
<td>(a)</td>
<td>(a)</td>
</tr>
<tr>
<td>Square Brackets</td>
<td>[b]</td>
<td>[b]</td>
</tr>
<tr>
<td>Double Square Brackets</td>
<td>ldbracket c rdbracket</td>
<td>[c]</td>
</tr>
<tr>
<td>Single line</td>
<td>lline a rline</td>
<td></td>
</tr>
<tr>
<td>Double line</td>
<td>ldline a rdline</td>
<td></td>
</tr>
<tr>
<td>Braces</td>
<td>lbrace w rbrace</td>
<td>{w}</td>
</tr>
<tr>
<td>Angle Brackets</td>
<td>langle d rangle</td>
<td>\langle d \rangle</td>
</tr>
<tr>
<td>Operator Brackets</td>
<td>langle a mline b rangle</td>
<td>\langle a</td>
</tr>
<tr>
<td>Group brackets (used for program control)</td>
<td>{a}</td>
<td>a</td>
</tr>
<tr>
<td>Scalable round brackets (add the word “left before a left bracket and “right” before a right bracket).</td>
<td>left ( stack{a # b # z} right )</td>
<td>\left( \begin{array}{c} a \ b \ z \end{array} \right)</td>
</tr>
<tr>
<td>Square brackets scalable (as above).</td>
<td>left [ stack{ x # y} right ]</td>
<td>\left[ \begin{array}{c} x \ y \end{array} \right]</td>
</tr>
<tr>
<td>Double square brackets scalable</td>
<td>left ldbracket c right rdbracket</td>
<td>\left[ c \right]</td>
</tr>
<tr>
<td>Line scalable</td>
<td>left lline a right rline</td>
<td></td>
</tr>
<tr>
<td>Double line scalable</td>
<td>left ldline d right rdline</td>
<td></td>
</tr>
<tr>
<td>Brace scalable</td>
<td>left lbrace e right rbrace</td>
<td>{e}</td>
</tr>
<tr>
<td>Angle bracket scalable</td>
<td>left langle f right rangle</td>
<td>\langle f \rangle</td>
</tr>
<tr>
<td>Operator brackets scalable</td>
<td>left langle g mline h right rangle</td>
<td>\langle g</td>
</tr>
<tr>
<td>Over brace scalable</td>
<td>{The brace is above} overbrace a</td>
<td>\overbrace{a}^{The brace is above}</td>
</tr>
<tr>
<td>Under brace scaleable</td>
<td>{the brace is below} underbrace {f}</td>
<td>\underbrace{f}_{the brace is below}</td>
</tr>
</tbody>
</table>
## Formats

**Table 9. Commands, formats**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Superscript</td>
<td>a lsup{b}</td>
<td>(^b\text{a})</td>
</tr>
<tr>
<td>Center Superscript</td>
<td>sum(a)a csup{b}</td>
<td>(b\text{a})</td>
</tr>
<tr>
<td>Right Superscript</td>
<td>a(^{\text{c}})(b)</td>
<td>(a^b)</td>
</tr>
<tr>
<td>Left subscript</td>
<td>a lsub{b}</td>
<td>(_{\text{a}}\text{b})</td>
</tr>
<tr>
<td>Center subscript</td>
<td>a csub{b}</td>
<td>(_a\text{b})</td>
</tr>
<tr>
<td>Right subscript</td>
<td>a_{\text{b}}</td>
<td>(a_b)</td>
</tr>
<tr>
<td>Align character to left</td>
<td>stack { Hello world # alignl (a) }</td>
<td>Hello world ((a))</td>
</tr>
<tr>
<td>Align character to center</td>
<td>stack{Hello world # alignc(a)}</td>
<td>Hello world ((a))</td>
</tr>
<tr>
<td>Align character to right</td>
<td>stack { Hello world # alignr(a)}</td>
<td>Hello world ((a))</td>
</tr>
<tr>
<td>Vertical stack of 2</td>
<td>binom{a}{b}</td>
<td>(a\text{b})</td>
</tr>
<tr>
<td>Vertical stack, more than 2</td>
<td>stack{a # b # z}</td>
<td>(a\text{b}\text{z})</td>
</tr>
<tr>
<td>Matrix stack</td>
<td>matrix{a # b # c # d}</td>
<td>(a\text{b}\text{c}\text{d})</td>
</tr>
<tr>
<td>Common mathematical arrangement</td>
<td>matrix{a #&quot;=&quot;b #&quot;=&quot; [ ] #&quot;=&quot;c}</td>
<td>(a\text{=b}\text{=c})</td>
</tr>
<tr>
<td>New Line</td>
<td>asldkfjo newline sadkfj</td>
<td>asldkfjo sadkfj</td>
</tr>
<tr>
<td>Small gap (apostrophe)</td>
<td>stuffstuff</td>
<td>stuff stuff</td>
</tr>
<tr>
<td>Large gap (tilde)</td>
<td>stuff-stuff</td>
<td>stuff stuff</td>
</tr>
</tbody>
</table>
### Characters – Greek

**Table 10. Characters, Greek**

<table>
<thead>
<tr>
<th>%ALPHA</th>
<th>A</th>
<th>%BETA</th>
<th>B</th>
<th>%CHI</th>
<th>X</th>
<th>%DELTA</th>
<th>Δ</th>
<th>%EPSILON</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>%ETA</td>
<td>H</td>
<td>%GAMMA</td>
<td>Γ</td>
<td>%IOTA</td>
<td>I</td>
<td>%KAPPA</td>
<td>K</td>
<td>%LAMBDA</td>
<td>Λ</td>
</tr>
<tr>
<td>%MU</td>
<td>M</td>
<td>%NU</td>
<td>N</td>
<td>%OMEGA</td>
<td>Ω</td>
<td>%OMICRON</td>
<td>O</td>
<td>%PHI</td>
<td>φ</td>
</tr>
<tr>
<td>%PI</td>
<td>Π</td>
<td>%PSI</td>
<td>Ψ</td>
<td>%RHO</td>
<td>P</td>
<td>%SIGMA</td>
<td>Σ</td>
<td>%THETA</td>
<td>θ</td>
</tr>
<tr>
<td>%UPSILON</td>
<td>Y</td>
<td>%XI</td>
<td>Ξ</td>
<td>%ZETA</td>
<td>Z</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%alpha</td>
<td>α</td>
<td>%beta</td>
<td>β</td>
<td>%chi</td>
<td>χ</td>
<td>%delta</td>
<td>δ</td>
<td>%epsilon</td>
<td>ε</td>
</tr>
<tr>
<td>%eta</td>
<td>η</td>
<td>%gamma</td>
<td>γ</td>
<td>%iota</td>
<td>i</td>
<td>%kappa</td>
<td>κ</td>
<td>%lambda</td>
<td>λ</td>
</tr>
<tr>
<td>%mu</td>
<td>μ</td>
<td>%nu</td>
<td>ν</td>
<td>%omega</td>
<td>ω</td>
<td>%omicron</td>
<td>o</td>
<td>%phi</td>
<td>φ</td>
</tr>
<tr>
<td>%pi</td>
<td>π</td>
<td>%rho</td>
<td>ρ</td>
<td>%sigma</td>
<td>σ</td>
<td>%tau</td>
<td>τ</td>
<td>%theta</td>
<td>θ</td>
</tr>
<tr>
<td>%upsilon</td>
<td>υ</td>
<td>%varepsilon</td>
<td>ε</td>
<td>%varphi</td>
<td>φ</td>
<td>%varpi</td>
<td>ϖ</td>
<td>%vvarho</td>
<td>ϑ</td>
</tr>
<tr>
<td>%varsigma</td>
<td>ζ</td>
<td>%vartheta</td>
<td>θ</td>
<td>%xi</td>
<td>ξ</td>
<td>%zeta</td>
<td>ζ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Characters - Special

**Table 11. Characters, special**

<table>
<thead>
<tr>
<th>%and</th>
<th>∧</th>
<th>%angle</th>
<th>∠</th>
<th>%element</th>
<th>∈</th>
<th>%identical</th>
<th>≡</th>
</tr>
</thead>
<tbody>
<tr>
<td>%infinite</td>
<td>∞</td>
<td>%noelement</td>
<td>∉</td>
<td>%notequal</td>
<td>≠</td>
<td>%or</td>
<td>∨</td>
</tr>
<tr>
<td>%perthousand</td>
<td>%</td>
<td>%strictlygreaterthan</td>
<td>≫</td>
<td>%strictlylessthan</td>
<td>≪</td>
<td>%tendto</td>
<td>→</td>
</tr>
</tbody>
</table>