převzato z
http://en.wikipedia.orghttp://ara.karlov.mff.cuni.cz:8080/w/index.php?title=Help:Displaying_a_formula&action=edit {shortcut|WP:MATH|Help:Math}} :Redirect6

MediaWiki uses a subset of AMS-LaTeX markup, a superset of LaTeX markup which is in turn a superset of TeX markup, for mathematical formulae. It generates either PNG images or simple HTML markup, depending on user preferences and the complexity of the expression. In the future, as more browsers become smarter, it will be able to generate enhanced HTML or even MathML in many cases. (See blahtex for information about current work on adding MathML support.)

Although, in all cases mentioned, :TeX is generated by compilation, and not by an interpreter program, there is one essential difference between, e.g., Knuth's TeX or Lamport's LaTeX and the present implementation: whereas in the first two cases the compiler typically generates an *all-in-one* printable output, which has the quality of a whole book with all chapters, sections and subsections, and where no line is "special", in the present case one has, typically, a mixture of :TeX images (more precisely: PNG images) for the equations, embedded into usual text, and with short :TeX elements usually replaced by HTML parts. As a consequence, in many cases TeX-elements, e.g. vector symbols, "stick out" below (or above) the text line. This "sticking out" is *not* the case in the above-mentioned original products, and the HTML-substitutes for small :TeX additions to the text are often insufficient in quality for many readers. In spite of these shortcomings, the present product characterized by "many embedded PNG-images" should be preferred for small texts, where the equations do not dominate.

More precisely, MediaWiki filters the markup through Texvc, which in turn passes the commands to :TeX for the actual rendering. Thus, only a limited part of the full :TeX language is supported; see below for details.

To have math rendered in a particular MediaWiki installation, one has to set `$wgUseTeX = true;` in LocalSettings.php.

Basics

Math markup goes inside `<math> ... </math>`.

The :TeX code has to be put literally: MediaWiki templates, predefined templates, and parameters cannot be used within math tags: pairs of double braces are ignored and "#" gives an error message. However, math tags work in the then and else part of #if, etc. See :Tim for more information.

LaTeX commands

LaTeX commands are case-sensitive, and take one of the following two formats:

- They start with a backslash \ and then have a name consisting of letters only. Command names are terminated by a space, a number or any other "non-letter".
- They consist of a backslash \ and exactly one non-letter.

Some commands need an argument, which has to be given between curly braces { } after the command name. Some commands support optional parameters, which are added after the command name in square brackets []. The general syntax is:

```
\commandname[option1,option2,...]{argument1}{argument2}...
```

Special characters

The following symbols are reserved characters that either have a special meaning under LaTeX or are unavailable in all the fonts. If you enter them directly in your text, they will normally not render, but rather do things you did not intend.

```
# $ % ^ & _ { } ~ \
```

These characters can be entered by adding a prefix backslash:

```
\# \$ \% \textasciicircum{} \& \_ \{ \} \~{} \textbackslash{}
```

The other symbols and many more can be rendered with special commands in mathematical formulae or as accents.

The backslash character \ can *not* be entered by adding another backslash in front of it (\\); this sequence is used for line breaking. For introducing a backslash in math mode, you can use \backslash instead.

The command \~ produces a tilde which is placed over the next letter. For example \~n gives ñ. To produce just the character ~, use \~{} which places a ~ over an empty box. Alternatively \sim produces a large centred ~ which may be more appropriate in some situations, but may not render properly in simple expressions which are converted to html.

Similarly, the command \^ produces a hat over the next character, for example \^{o} produces ô. If you need in text to display the ^ symbol you have to use \textasciicircum.

Spaces

"Whitespace" characters, such as blank or tab, are treated uniformly as "space" by LaTeX. Several consecutive whitespace characters are treated as one "space". See below for commands that produces spaces of different size.

LaTeX environments

Environments in LaTeX have a role that is quite similar to commands, but they usually have effect on a wider part of formula. Their syntax is:

```
\begin{environmentname}
  text to be influenced
\end{environmentname}
```

Environments supported by Wikipedia include *matrix*, *align*, etc. See below.

Rendering

$e^{i\pi} + 1 = 0$ $e^{i\pi} + 1 = 0$ $e^{i\pi} + 1 = 0$

By default, the PNG images are rendered black on white, with a transparent background. On darker backgrounds, the characters may show white edges. To remove these, match the PNG background color with the background color of the page using `\pagecolor`.

The colors, as well as font sizes and types, are independent of browser settings or CSS. Font sizes

and types will often deviate from what HTML renders. Vertical alignment with the surrounding text can also be a problem (see bug 32694). The css selector of the images is `img.tex`.

The alt text of the PNG images, which is displayed to visually impaired and other readers who cannot see the images, and is also used when the text is selected and copied, defaults to the wikitext that produced the image, excluding the `<math>` and `</math>`. You can override this by explicitly specifying an `alt` attribute for the `math` element. For example, `<math alt="Square root of pi">\sqrt{\pi}</math>` generates an image $\sqrt{\pi}$ whose alt text is "Square root of pi".

Apart from function and operator names, as is customary in mathematics, variables and letters are in italics; digits are not. For other text, (like variable labels) to avoid being rendered in italics like variables, use `\text`, `\mbox`, or `\mathrm`. You can also define new function names using `\operatorname{...}`. For example, `<math>\text{abc}</math>` gives abc. This does not work for special characters, they are ignored unless the whole <math> expression is rendered in HTML:

- `<math>\text {abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}</math>`
- `<math>\text {abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}\,</math>`

gives:

- $\text{abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}$
- $\text{abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}\,$

See bug 798 for details.

Nevertheless, using `\mbox` instead of `\text`, more characters are allowed

For example,

- `<math>\mbox {abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}</math>`
- `<math>\mbox {abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}\,</math>`

gives:

- $\mbox{abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}$
- $\mbox{abcdefghijklmnopqrstuvwxyzàáâãäåæçčďèéěêëìíîïňñòóôõöřšť÷øùúůûüýÿž}\,$

But `\mbox{ð}` and `\mbox{þ}` will give an error:

- **Nelze pochopit (Selhala konverze do PNG; zkontrolujte správnou instalaci latexu a dvipng (nebo dvips + gs + convert)): \mbox {ð}**
- **Nelze pochopit (Selhala konverze do PNG; zkontrolujte správnou instalaci latexu a dvipng (nebo dvips + gs + convert)): \mbox {þ}**

:TeX vs HTML

Before introducing :TeX markup for producing special characters, it should be noted that, as this comparison table shows, sometimes similar results can be achieved in HTML (see Help:Special characters).

:TeX syntax (forcing PNG)	:TeX rendering	HTML syntax	HTML rendering
`<math>\alpha\,\!</math>`	α	`{{math|<VAR>&alpha;</VAR>}}`	:Math
`<math> f(x) = x^2\,\!</math>`	$f(x) = x^2$	`{{math|''f''(<var>x</var>) {{=}} <var>x</var><sup>2</sup>}}`	:Math
`<math>\sqrt{2}</math>`	$\sqrt{2}$	`{{math|{{radical|2}}}}`	:Math
`<math>\sqrt{1-e^2}</math>`	$\sqrt{1-e^2}$	`{{math|{{radical|1 &minus; ''e''&sup2;}}}}`	:Math

The codes on the left produce the symbols on the right, but the latter can also be put directly in the wikitext, except for '='.

Syntax	Rendering
`&alpha; &beta; &gamma; &delta; &epsilon; &zeta;`	α β γ δ ε ζ
`&eta; &theta; &iota; &kappa; &lambda; &mu; &nu;`	η θ ι κ λ μ ν
`&xi; &omicron; &pi; &rho; &sigma; &sigmaf;`	ξ ο π ρ σ ς
`&tau; &upsilon; &phi; &chi; &psi; &omega;`	τ υ φ χ ψ ω
`&Gamma; &Delta; &Theta; &Lambda; &Xi; &Pi;`	Γ Δ Θ Λ Ξ Π
`&Sigma; &Phi; &Psi; &Omega;`	Σ Φ Ψ Ω
`&int; &sum; &prod; &radic; &minus; &plusmn; &infin;`	∫ ∑ ∏ √ − ± ∞
`&asymp; &prop; {{=}} &equiv; &ne; &le; &ge;`	≈ ∝ = ≡ ≠ ≤ ≥
`&times; &middot; &divide; &part; &prime; &Prime;`	× · ÷ ∂ ′ ″
`&nabla; &permil; &deg; &there4; &Oslash; &oslash;`	∇ ‰ ° ∴ Ø ø
`&isin; &notin; &cap; &cup; &sub; &sup; &sube; &supe;`	∈ ∉ ∩ ∪ ⊂ ⊃ ⊆ ⊇
`&not; &and; &or; &exist; &forall;`	¬ ∧ ∨ ∃ ∀
`&rArr; &hArr; &rarr; &harr; &uarr;`	⇒ ⇔ → ↔ ↑
`&alefsym; - &ndash; &mdash;`	ℵ - – —

The project has settled on both HTML and :TeX because each has advantages in some situations.

Pros of HTML

1. Formulas in HTML behave more like regular text. In-line HTML formulae always align properly with the rest of the HTML text and, to some degree, can be copied-and-pasted (this is not a problem if :TeX is rendered using MathJax, and the alignment should not be a problem for PNG rendering once bug 32694 is fixed).
2. The formula's background and font size match the rest of HTML contents (this can be fixed on :TeX formulas by using the commands `\pagecolor` and `\definecolor`) and the appearance respects CSS and browser settings while the typeface is conveniently altered to help you identify formulae.
3. Pages using HTML code for formulae will load faster and they will create less clutter on your hard disk.
4. Formulae typeset with HTML code will be accessible to client-side script links (a.k.a. scriptlets).
5. The display of a formula entered using mathematical templates can be conveniently altered by

modifying the templates involved; this modification will affect all relevant formulae without any manual intervention.
6. The HTML code, if entered diligently, will contain all semantic information to transform the equation back to :TeX or any other code as needed. It can even contain differences :TeX does not normally catch, e.g. `{{math|''i''}}` for the imaginary unit and `{{math|<var>i</var>}}` for an arbitrary index variable.

Pros of :TeX

1. :TeX is semantically more precise than HTML.
   1. In :TeX, "`<math>x</math>`" means "mathematical variable x", whereas in HTML "`x`" is generic and somewhat ambiguous.
   2. On the other hand, if you encode the same formula as "`{{math|<var>x</var>}}`", you get the same visual result :Math and no information is lost. This requires diligence and more typing that could make the formula harder to understand as you type it. However, since there are far more readers than editors, this effort is worth considering if no other rendering options are available (such as MathJax, which was requested on bug 31406 for use on Wikimedia wikis and is being implemented on Extension:Math as a new rendering option).
2. One consequence of point 1 is that :TeX code can be transformed into HTML, but not vice-versa. :Ref This means that on the server side we can always transform a formula, based on its complexity and location within the text, user preferences, type of browser, etc. Therefore, where possible, all the benefits of HTML can be retained, together with the benefits of :TeX. It is true that the current situation is not ideal, but that is not a good reason to drop information/contents. It is more a reason to help improve the situation.
3. Another consequence of point 1 is that :TeX can be converted to MathML (e.g. by MathJax) for browsers which support it, thus keeping its semantics and allowing the rendering to be better suited for the reader's graphic device.
4. :TeX is the preferred text formatting language of most professional mathematicians, scientists, and engineers. It is easier to persuade them to contribute if they can write in :TeX.
5. :TeX has been specifically designed for typesetting formulae, so input is easier and more natural if you are accustomed to it, and output is more aesthetically pleasing if you focus on a single formula rather than on the whole containing page.
6. Once a formula is done correctly in :TeX, it will render reliably, whereas the success of HTML formulae is somewhat dependent on browsers or versions of browsers. Another aspect of this dependency is fonts: the serif font used for rendering formulae is browser-dependent and it may be missing some important glyphs. While the browser generally capable to substitute a matching glyph from a different font family, it need not be the case for combined glyphs (compare ' *:IPA* ' and ' $\bar{a}$ ').
7. When writing in :TeX, editors need not worry about whether this or that version of this or that browser supports this or that HTML entity. The burden of these decisions is put on the software. This does not hold for HTML formulae, which can easily end up being rendered wrongly or differently from the editor's intentions on a different browser.:Ref
8. :TeX formulae, by default, render larger and are usually more readable than HTML formulae and are not dependent on client-side browser resources, such as fonts, and so the results are more reliably WYSIWYG.
9. While :TeX does not assist you in finding HTML codes or Unicode values (which you can obtain by viewing the HTML source in your browser), copying and pasting from a :TeX PNG image in Wikipedia into simple text will return the LaTeX source.

:Note unless your wikitext follows the style of point 1.2
:Note The entity support problem is not limited to mathematical formulae though; it can be easily solved by using

> the corresponding characters instead of entities, as the character repertoire links do, except for cases where the corresponding glyphs are visually indiscernible (e.g. – for '–' and − for '−').

In some cases it may be the best choice to use neither :TeX nor the HTML substitutes, but instead the simple ASCII symbols of a standard keyboard (see hereafter, for an example).

Functions, symbols, special characters

Accents/diacritics

`\dot{a}, \ddot{a}, \acute{a}, \grave{a}`	$\dot{a}, \ddot{a}, \acute{a}, \grave{a}$
`\check{a}, \breve{a}, \tilde{a}, \bar{a}`	$\check{a}, \breve{a}, \tilde{a}, \bar{a}$
`\hat{a}, \widehat{a}, \vec{a}`	$\hat{a}, \widehat{a}, \vec{a}$

Standard numerical functions

`\exp_a b = a^b, \exp b = e^b, 10^m`	$\exp_a b = a^b, \exp b = e^b, 10^m$
`\ln c, \lg d = \log e, \log_{10} f`	$\ln c, \lg d = \log e, \log_{10} f$
`\sin a, \cos b, \tan c, \cot d, \sec e, \csc f`	$\sin a, \cos b, \tan c, \cot d, \sec e, \csc f$
`\arcsin h, \arccos i, \arctan j`	$\arcsin h, \arccos i, \arctan j$
`\sinh k, \cosh l, \tanh m, \coth n`	$\sinh k, \cosh l, \tanh m, \coth n$
`\operatorname{sh}\,k, \operatorname{ch}\,l, \operatorname{th}\,m, \operatorname{coth}\,n`	$\operatorname{sh}\,k, \operatorname{ch}\,l, \operatorname{th}\,m, \operatorname{coth}\,n$
`\operatorname{argsh}\,o, \operatorname{argch}\,p, \operatorname{argth}\,q`	$\operatorname{argsh}\,o, \operatorname{argch}\,p, \operatorname{argth}\,q$
`\sgn r, \left\vert s \right\vert`	$\sgn r, \left\vert s \right\vert$
`\min(x,y), \max(x,y)`	$\min(x,y), \max(x,y)$

Bounds

`\min x, \max y, \inf s, \sup t`	$\min x, \max y, \inf s, \sup t$
`\lim u, \liminf v, \limsup w`	$\lim u, \liminf v, \limsup w$
`\dim p, \deg q, \det m, \ker\phi`	$\dim p, \deg q, \det m, \ker\phi$

Projections

`\Pr j, \hom l, \lVert z \rVert, \arg z`	$\Pr j, \hom l, \lVert z \rVert, \arg z$

Differentials and derivatives

`dt, \operatorname{d}\!t, \partial t, \nabla\psi`	$dt, \operatorname{d}\!t, \partial t, \nabla\psi$
`dy/dx, \operatorname{d}\!y/\operatorname{d}\!x, {dy \over dx}, {\operatorname{d}\!y\over\operatorname{d}\!x}, {\partial^2\over\partial x_1\partial x_2}y`	$dy/dx, \operatorname{d}\!y/\operatorname{d}\!x, \frac{dy}{dx}, \frac{\operatorname{d}\!y}{\operatorname{d}\!x}, \frac{\partial^2}{\partial x_1 \partial x_2} y$
`\prime, \backprime, f^\prime, f', f'', f^{(3)}, \dot y, \ddot y`	$\prime, \backprime, f^\prime, f', f'', f^{(3)}, \dot y, \ddot y$

Letter-like symbols or constants

`\infty, \aleph, \complement, \backepsilon, \eth, \Finv, \hbar`	$\infty, \aleph, \complement, \backepsilon, \eth, \Finv, \hbar$
`\Im, \imath, \jmath, \Bbbk, \ell, \mho, \wp, \Re, \circledS`	$\Im, \imath, \jmath, \Bbbk, \ell, \mho, \wp, \Re, \circledS$

Modular arithmetic

```
s_k \equiv 0 \pmod{m}
```
$s_k \equiv 0 \pmod{m}$

```
a\,\bmod\,b
```
$a \bmod b$

```
\gcd(m, n), \operatorname{lcm}(m, n)
```
$\gcd(m,n), \operatorname{lcm}(m,n)$

```
\mid, \nmid, \shortmid, \nshortmid
```
$\mid, \nmid, \shortmid, \nshortmid$

Radicals

```
\surd, \sqrt{2}, \sqrt[n]{}, \sqrt[3]{x^3+y^3 \over 2}
```
$\surd, \sqrt{2}, \sqrt[n]{}, \sqrt[3]{x^3+y^3 \over 2}$

Operators

```
+, -, \pm, \mp, \dotplus
```
$+, -, \pm, \mp, \dotplus$

```
\times, \div, \divideontimes, /, \backslash
```
$\times, \div, \divideontimes, /, \backslash$

```
\cdot, * \ast, \star, \circ, \bullet
```
$\cdot, * \ast, \star, \circ, \bullet$

```
\boxplus, \boxminus, \boxtimes, \boxdot
```
$\boxplus, \boxminus, \boxtimes, \boxdot$

```
\oplus, \ominus, \otimes, \oslash, \odot
```
$\oplus, \ominus, \otimes, \oslash, \odot$

```
\circleddash, \circledcirc, \circledast
```
$\circleddash, \circledcirc, \circledast$

```
\bigoplus, \bigotimes, \bigodot
```
$\bigoplus, \bigotimes, \bigodot$

Sets

```
\{ \}, \O \empty \emptyset, \varnothing
```
$\{ \}, \O \empty \emptyset, \varnothing$

```
\in, \notin \not\in, \ni, \not\ni
```
$\in, \notin \not\in, \ni, \not\ni$

```
\cap, \Cap, \sqcap, \bigcap
```
$\cap, \Cap, \sqcap, \bigcap$

```
\cup, \Cup, \sqcup, \bigcup, \bigsqcup, \uplus, \biguplus
```
$\cup, \Cup, \sqcup, \bigcup, \bigsqcup, \uplus, \biguplus$

```
\setminus, \smallsetminus, \times
```
$\setminus, \smallsetminus, \times$

```
\subset, \Subset, \sqsubset
```
$\subset, \Subset, \sqsubset$

```
\supset, \Supset, \sqsupset
```
$\supset, \Supset, \sqsupset$

```
\subseteq, \nsubseteq, \subsetneq, \varsubsetneq, \sqsubseteq
```
$\subseteq, \nsubseteq, \subsetneq, \varsubsetneq, \sqsubseteq$

```
\supseteq, \nsupseteq, \supsetneq, \varsupsetneq, \sqsupseteq
```
$\supseteq, \nsupseteq, \supsetneq, \varsupsetneq, \sqsupseteq$

```
\subseteqq, \nsubseteqq, \subsetneqq, \varsubsetneqq
```
$\subseteqq, \nsubseteqq, \subsetneqq, \varsubsetneqq$

```
\supseteqq, \nsupseteqq, \supsetneqq, \varsupsetneqq
```
$\supseteqq, \nsupseteqq, \supsetneqq, \varsupsetneqq$

Relations

```
=, \ne \neq, \equiv, \not\equiv
```
$=, \ne \neq, \equiv, \not\equiv$

```
\doteq, \overset{\underset{\mathrm{def}}{}}{=}, :=
```
$\doteq, \overset{\underset{\mathrm{def}}{}}{=}, :=$

```
\sim, \nsim, \backsim, \thicksim, \simeq, \backsimeq, \eqsim, \cong, \ncong
```
$\sim, \nsim, \backsim, \thicksim, \simeq, \backsimeq, \eqsim, \cong, \ncong$

```
\approx, \thickapprox, \approxeq, \asymp, \propto, \varpropto
```
$\approx, \thickapprox, \approxeq, \asymp, \propto, \varpropto$

```
<, \nless, \ll, \not\ll, \lll, \not\lll, \lessdot
```
$<, \nless, \ll, \not\ll, \lll, \not\lll, \lessdot$

```
>, \ngtr, \gg, \not\gg, \ggg, \not\ggg, \gtrdot
```
$>, \ngtr, \gg, \not\gg, \ggg, \not\ggg, \gtrdot$

`\le \leq, \lneq, \leqq, \nleqq, \lneqq, \lvertneqq`	$\le \leq, \lneq, \leqq, \nleqq, \lneqq, \lvertneqq$
`\ge \geq, \gneq, \geqq, \ngeqq, \gneqq, \gvertneqq`	$\ge \geq, \gneq, \geqq, \ngeqq, \gneqq, \gvertneqq$
`\lessgtr \lesseqgtr \lesseqqgtr \gtrless \gtreqless \gtreqqless`	$\lessgtr \lesseqgtr \lesseqqgtr \gtrless \gtreqless \gtreqqless$
`\leqslant, \nleqslant, \eqslantless`	$\leqslant, \nleqslant, \eqslantless$
`\geqslant, \ngeqslant, \eqslantgtr`	$\geqslant, \ngeqslant, \eqslantgtr$
`\lesssim, \lnsim, \lessapprox, \lnapprox`	$\lesssim, \lnsim, \lessapprox, \lnapprox$
`\gtrsim, \gnsim, \gtrapprox, \gnapprox`	$\gtrsim, \gnsim, \gtrapprox, \gnapprox$
`\prec, \nprec, \preceq, \npreceq, \precneqq`	$\prec, \nprec, \preceq, \npreceq, \precneqq$
`\succ, \nsucc, \succeq, \nsucceq, \succneqq`	$\succ, \nsucc, \succeq, \nsucceq, \succneqq$
`\preccurlyeq, \curlyeqprec`	$\preccurlyeq, \curlyeqprec$
`\succcurlyeq, \curlyeqsucc`	$\succcurlyeq, \curlyeqsucc$
`\precsim, \precnsim, \precapprox, \precnapprox`	$\precsim, \precnsim, \precapprox, \precnapprox$
`\succsim, \succnsim, \succapprox, \succnapprox`	$\succsim, \succnsim, \succapprox, \succnapprox$

Geometric

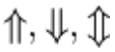
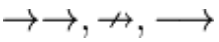
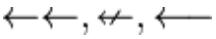
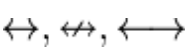
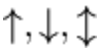
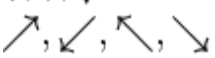
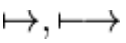
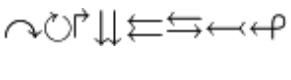
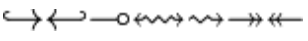
`\parallel, \nparallel, \shortparallel, \nshortparallel`	$\parallel, \nparallel, \shortparallel, \nshortparallel$
`\perp, \angle, \sphericalangle, \measuredangle, 45^\circ`	$\perp, \angle, \sphericalangle, \measuredangle, 45^\circ$
`\Box, \blacksquare, \diamond, \Diamond \lozenge, \blacklozenge, \bigstar`	$\Box, \blacksquare, \diamond, \Diamond \lozenge, \blacklozenge, \bigstar$
`\bigcirc, \triangle \bigtriangleup, \bigtriangledown`	$\bigcirc, \triangle \bigtriangleup, \bigtriangledown$
`\vartriangle, \triangledown`	$\vartriangle, \triangledown$
`\blacktriangle, \blacktriangledown, \blacktriangleleft, \blacktriangleright`	$\blacktriangle, \blacktriangledown, \blacktriangleleft, \blacktriangleright$

Logic

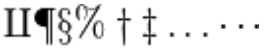
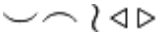
`\forall, \exists, \nexists`	$\forall, \exists, \nexists$
`\therefore, \because, \And`	$\therefore, \because, \And$
`\or \lor \vee, \curlyvee, \bigvee`	$\or \lor \vee, \curlyvee, \bigvee$
`\and \land \wedge, \curlywedge, \bigwedge`	$\and \land \wedge, \curlywedge, \bigwedge$
`\bar{q}, \overline{q}, \lnot \neg, \not\operatorname{R}, \bot, \top`	$\bar{q}, \overline{q}, \lnot \neg, \not\operatorname{R}, \bot, \top$
`\vdash \dashv, \vDash, \Vdash, \models`	$\vdash \dashv, \vDash, \Vdash, \models$
`\Vvdash \nvdash \nVdash \nvDash \nVDash`	$\Vvdash \nvdash \nVdash \nvDash \nVDash$
`\ulcorner \urcorner \llcorner \lrcorner`	$\ulcorner \urcorner \llcorner \lrcorner$

Arrows

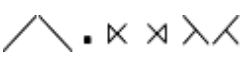
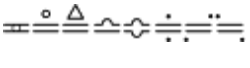
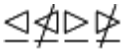
`\Rrightarrow, \Lleftarrow`	$\Rrightarrow, \Lleftarrow$
`\Rightarrow, \nRightarrow, \Longrightarrow \implies`	$\Rightarrow, \nRightarrow, \Longrightarrow \implies$
`\Leftarrow, \nLeftarrow, \Longleftarrow`	$\Leftarrow, \nLeftarrow, \Longleftarrow$

`\Leftrightarrow, \nLeftrightarrow, \Longleftrightarrow \iff`	
`\Uparrow, \Downarrow, \Updownarrow`	
`\rightarrow \to, \nrightarrow, \longrightarrow`	
`\leftarrow \gets, \nleftarrow, \longleftarrow`	
`\leftrightarrow, \nleftrightarrow, \longleftrightarrow`	
`\uparrow, \downarrow, \updownarrow`	
`\nearrow, \swarrow, \nwarrow, \searrow`	
`\mapsto, \longmapsto`	
`\rightharpoonup \rightharpoondown \leftharpoonup \leftharpoondown \upharpoonleft \upharpoonright \downharpoonleft \downharpoonright \rightleftharpoons \leftrightharpoons`	
`\curvearrowleft \circlearrowleft \Lsh \upuparrows \rightrightarrows \rightleftarrows \rightarrowtail \looparrowright`	
`\curvearrowright \circlearrowright \Rsh \downdownarrows \leftleftarrows \leftrightarrows \leftarrowtail \looparrowleft`	
`\hookrightarrow \hookleftarrow \multimap \leftrightsquigarrow \rightsquigarrow \twoheadrightarrow \twoheadleftarrow`	

Special

`\amalg \P \S \% \dagger \ddagger \ldots \cdots`	
`\smile \frown \wr \triangleleft \triangleright`	
`\diamondsuit, \heartsuit, \clubsuit, \spadesuit, \Game, \flat, \natural, \sharp`	

Unsorted (new stuff)

`\diagup \diagdown \centerdot \ltimes \rtimes \leftthreetimes \rightthreetimes`	
`\eqcirc \circeq \triangleq \bumpeq \Bumpeq \doteqdot \risingdotseq \fallingdotseq`	
`\intercal \barwedge \veebar \doublebarwedge \between \pitchfork`	
`\vartriangleleft \ntriangleleft \vartriangleright \ntriangleright`	
`\trianglelefteq \ntrianglelefteq \trianglerighteq \ntrianglerighteq`	

For a little more semantics on these symbols, see the brief TeX Cookbook.

Larger expressions

Subscripts, superscripts, integrals

Feature	Syntax	How it looks rendered	
		HTML	PNG
Superscript	`a^2`	a^2	a^2
Subscript	`a_2`	a_2	a_2
Grouping	`10^{30} a^{2+2}`	$10^{30}a^{2+2}$	$10^{30}a^{2+2}$
	`a_{i,j} b_{f'}`	$a_{i,j}b_{f'}$	$a_{i,j}b_{f'}$
Combining sub & super without and with horizontal separation	`x_2^3`		x_2^3
	`{x_2}^3`		${x_2}^3$
Super super	`10^{10^{8}}`		10^{10^8}
Preceding and/or additional sub & super	`\sideset{_1^2}{_3^4}\prod_a^b`		$\sideset{_1^2}{_3^4}\prod_a^b$
	`{}_1^2\!\Omega_3^4`		${}_1^2\!\Omega_3^4$
Stacking	`\overset{\alpha}{\omega}`		$\overset{\alpha}{\omega}$
	`\underset{\alpha}{\omega}`		$\underset{\alpha}{\omega}$
	`\overset{\alpha}{\underset{\gamma}{\omega}}`		$\overset{\alpha}{\underset{\gamma}{\omega}}$
	`\stackrel{\alpha}{\omega}`		$\stackrel{\alpha}{\omega}$
Derivative (f in italics may overlap primes in HTML)	`x', y'', f', f''`	x', y'', f', f''	x', y'', f', f''
Derivative (wrong in HTML)	`x^\prime, y^{\prime\prime}`	x', y''	x', y''
Derivative (wrong in PNG)	`x\prime, y\prime\prime`	$x\prime, y\prime\prime$	$x\prime, y\prime\prime$
Derivative dots	`\dot{x}, \ddot{x}`		$\dot{x}, \ddot{x}$
Underlines, overlines, vectors	`\hat a \ \bar b \ \vec c`	$\hat{a}\ \bar{b}\ \vec{c}$	
	`\overrightarrow{a b} \ \overleftarrow{c d} \ \widehat{d e f}`	$\overrightarrow{ab}\ \overleftarrow{cd}\ \widehat{def}$	
	`\overline{g h i} \ \underline{j k l}`	$\overline{ghi}\ \underline{jkl}$	
Arc (workaround)	`\overset{\frown} {AB}`	$\overset{\frown}{AB}$	
Arrows	`A \xleftarrow{n+\mu-1} B \xrightarrow[T]{n\pm i-1} C`	$A \xleftarrow{n+\mu-1} B \xrightarrow[T]{n\pm i-1} C$	
Overbraces	`\overbrace{ 1+2+\cdots+100 }^{5050}`	$\overbrace{1+2+\cdots+100}^{5050}$	
Underbraces	`\underbrace{ a+b+\cdots+z }_{26}`	$\underbrace{a+b+\cdots+z}_{26}$	
Sum	`\sum_{k=1}^N k^2`	$\sum_{k=1}^{N} k^2$	

Sum (force `\textstyle`)	`\textstyle \sum_{k=1}^N k^2`	$\textstyle \sum_{k=1}^N k^2$
Sum in a fraction (default `\textstyle`)	`\frac{\sum_{k=1}^N k^2}{a}`	$\frac{\sum_{k=1}^N k^2}{a}$
Sum in a fraction (force `\displaystyle`)	`\frac{\displaystyle \sum_{k=1}^N k^2}{a}`	$\frac{\displaystyle \sum_{k=1}^N k^2}{a}$
Product	`\prod_{i=1}^N x_i`	$\prod_{i=1}^N x_i$
Product (force `\textstyle`)	`\textstyle \prod_{i=1}^N x_i`	$\textstyle \prod_{i=1}^N x_i$
Coproduct	`\coprod_{i=1}^N x_i`	$\coprod_{i=1}^N x_i$
Coproduct (force `\textstyle`)	`\textstyle \coprod_{i=1}^N x_i`	$\textstyle \coprod_{i=1}^N x_i$
Limit	`\lim_{n \to \infty}x_n`	$\lim_{n \to \infty} x_n$
Limit (force `\textstyle`)	`\textstyle \lim_{n \to \infty}x_n`	$\textstyle \lim_{n \to \infty} x_n$
Integral	`\int\limits_{1}^{3}\frac{e^3/x}{x^2}\, dx`	$\int\limits_{1}^{3} \frac{e^3/x}{x^2}\, dx$
Integral (alternative limits style)	`\int_{1}^{3}\frac{e^3/x}{x^2}\, dx`	$\int_{1}^{3} \frac{e^3/x}{x^2}\, dx$
Integral (force `\textstyle`)	`\textstyle \int\limits_{-N}^{N} e^x\, dx`	$\textstyle \int\limits_{-N}^{N} e^x\, dx$
Integral (force `\textstyle`, alternative limits style)	`\textstyle \int_{-N}^{N} e^x\, dx`	$\textstyle \int_{-N}^{N} e^x\, dx$
Double integral	`\iint\limits_D \, dx\,dy`	$\iint\limits_D \, dx\,dy$
Triple integral	`\iiint\limits_E \, dx\,dy\,dz`	$\iiint\limits_E \, dx\,dy\,dz$
Quadruple integral	`\iiiint\limits_F \, dx\,dy\,dz\,dt`	$\iiiint\limits_F \, dx\,dy\,dz\,dt$
Line or path integral	`\int_{(x,y)\in C} x^3\, dx + 4y^2\, dy`	$\int_{(x,y)\in C} x^3\, dx + 4y^2\, dy$
Closed line or path integral	`\oint_{(x,y)\in C} x^3\, dx + 4y^2\, dy`	$\oint_{(x,y)\in C} x^3\, dx + 4y^2\, dy$

Intersections	`\bigcap_{i=_1}^n E_i`	$\bigcap_{i=1}^{n} E_i$
Unions	`\bigcup_{i=_1}^n E_i`	$\bigcup_{i=1}^{n} E_i$

Fractions, matrices, multilines

Feature	Syntax	How it looks rendered
Fractions	`\frac{2}{4}=0.5` or `{2 \over 4}=0.5`	$\frac{2}{4} = 0.5$
Small fractions	`\tfrac{2}{4} = 0.5`	$\tfrac{2}{4} = 0.5$
Large (normal) fractions	`\dfrac{2}{4} = 0.5 \qquad \dfrac{2}{c + \dfrac{2}{d + \dfrac{2}{4}}} = a`	$\dfrac{2}{4} = 0.5 \qquad \dfrac{2}{c + \dfrac{2}{d + \dfrac{2}{4}}} = a$
Large (nested) fractions	`\cfrac{2}{c + \cfrac{2}{d + \cfrac{2}{4}}} = a`	$\cfrac{2}{c + \cfrac{2}{d + \cfrac{2}{4}}} = a$
Cancellations in fractions	`\cfrac{x}{1 + \cfrac{\cancel{y}}{\cancel{y}}} = \cfrac{x}{2}`	$\cfrac{x}{1 + \cfrac{\cancel{y}}{\cancel{y}}} = \cfrac{x}{2}$
Binomial coefficients	`\binom{n}{k}`	$\binom{n}{k}$
Small binomial coefficients	`\tbinom{n}{k}`	$\tbinom{n}{k}$
Large (normal) binomial coefficients	`\dbinom{n}{k}`	$\dbinom{n}{k}$

Matrices

```
\begin{matrix}
 x & y \\
 z & v
\end{matrix}
```

$$\begin{matrix} x & y \\ z & v \end{matrix}$$

```
\begin{vmatrix}
 x & y \\
 z & v
\end{vmatrix}
```

$$\begin{vmatrix} x & y \\ z & v \end{vmatrix}$$

```
\begin{Vmatrix}
 x & y \\
 z & v
\end{Vmatrix}
```

$$\begin{Vmatrix} x & y \\ z & v \end{Vmatrix}$$

```
\begin{bmatrix}
 0 & \cdots & 0 \\
 \vdots & \ddots & \vdots \\
 0 & \cdots & 0
\end{bmatrix}
```

$$\begin{bmatrix} 0 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & 0 \end{bmatrix}$$

```
\begin{Bmatrix}
 x & y \\
 z & v
\end{Bmatrix}
```

$$\begin{Bmatrix} x & y \\ z & v \end{Bmatrix}$$

```
\begin{pmatrix}
 x & y \\
 z & v
\end{pmatrix}
```

$$\begin{pmatrix} x & y \\ z & v \end{pmatrix}$$

```
\bigl( \begin{smallmatrix}
 a&b\\ c&d
\end{smallmatrix} \bigr)
```

$$\bigl(\begin{smallmatrix} a&b\\ c&d \end{smallmatrix} \bigr)$$

Case distinctions

```
f(n) =
\begin{cases}
 n/2, & \text{if }n\text{ is
even} \\
 3n+1, & \text{if }n\text{ is
odd}
\end{cases}
```

$$f(n) = \begin{cases} n/2, & \text{if } n \text{ is even} \\ 3n+1, & \text{if } n \text{ is odd} \end{cases}$$

Multiline equations

```
\begin{align}
 f(x) & = (a+b)^2 \\
 & = a^2+2ab+b^2 \\
\end{align}
```

$$\begin{aligned} f(x) &= (a+b)^2 \\ &= a^2+2ab+b^2 \\ \end{aligned}$$

```
\begin{alignat}{2}
 f(x) & = (a-b)^2 \\
 & = a^2-2ab+b^2 \\
\end{alignat}
```

$$\begin{alignat}{2} f(x) &= (a-b)^2 \\ &= a^2-2ab+b^2 \\ \end{alignat}$$

Multiline equations (must define number of columns used ({lcr}) (should not be used unless needed)

```
\begin{array}{lcl}
 z & = & a \\
 f(x,y,z) & = & x + y + z
\end{array}
```

$$\begin{array}{lcl} z & = & a \\ f(x,y,z) & = & x + y + z \end{array}$$

Multiline equations (more)	`\begin{array}{lcr}`
	` z & = & a \\`
	` f(x,y,z) & = & x + y + z`
	`\end{array}`
		$\begin{array}{lcr} z & = & a \\ f(x,y,z) & = & x + y + z \end{array}$

Breaking up a long expression so that it wraps when necessary, at the expense of destroying correct spacing	`<math>f(x) \,\!</math>`
	`<math>= \sum_{n=0}^\infty a_n x^n`
	`</math>`
	`<math>=`
	`a_0+a_1x+a_2x^2+\cdots</math>`
		$f(x) = \sum_{n=0}^{\infty} a_n x^n = a_0 + a_1 x + a_2 x^2 + \cdots$

Simultaneous equations	`\begin{cases}`
	` 3x + 5y + z \\`
	` 7x - 2y + 4z \\`
	` -6x + 3y + 2z`
	`\end{cases}`
		$\begin{cases} 3x + 5y + z \\ 7x - 2y + 4z \\ -6x + 3y + 2z \end{cases}$

Arrays	`\begin{array}{|c|c||c|} a & b & S \\`
	`\hline`
	`0&0&1\\`
	`0&1&1\\`
	`1&0&1\\`
	`1&1&0\\`
	`\end{array}`
		$\begin{array}{\|c\|c\|\|c\|} a & b & S \\ \hline 0&0&1\\ 0&1&1\\ 1&0&1\\ 1&1&0\\ \end{array}$

Parenthesizing big expressions, brackets, bars

Feature	Syntax	How it looks rendered
Bad	`( \frac{1}{2} )`	$(\frac{1}{2})$
Good	`\left ( \frac{1}{2} \right )`	$\left(\frac{1}{2}\right)$

You can use various delimiters with \left and \right:

Feature	Syntax	How it looks rendered
Parentheses	`\left ( \frac{a}{b} \right )`	$\left(\frac{a}{b}\right)$
Brackets	`\left [ \frac{a}{b} \right ] \quad \left \lbrack \frac{a}{b} \right \rbrack`	$\left[\frac{a}{b}\right] \quad \left\lbrack\frac{a}{b}\right\rbrack$
Braces	`\left \{ \frac{a}{b} \right \} \quad \left \lbrace \frac{a}{b} \right \rbrace`	$\left\{\frac{a}{b}\right\} \quad \left\lbrace\frac{a}{b}\right\rbrace$
Angle brackets	`\left \langle \frac{a}{b} \right \rangle`	$\left\langle\frac{a}{b}\right\rangle$

Bars and double bars	`\left | \frac{a}{b} \right \vert \left \Vert \frac{c}{d} \right \\|`	$\left \| \frac{a}{b} \right \vert \left \Vert \frac{c}{d} \right \\|$
Floor and ceiling functions:	`\left \lfloor \frac{a}{b} \right \rfloor \left \lceil \frac{c}{d} \right \rceil`	$\left \lfloor \frac{a}{b} \right \rfloor \left \lceil \frac{c}{d} \right \rceil$
Slashes and backslashes	`\left / \frac{a}{b} \right \backslash`	$\left / \frac{a}{b} \right \backslash$
Up, down and up-down arrows	`\left \uparrow \frac{a}{b} \right \downarrow \quad \left \Uparrow \frac{a}{b} \right \Downarrow \quad \left \updownarrow \frac{a}{b} \right \Updownarrow`	$\left \uparrow \frac{a}{b} \right \downarrow \quad \left \Uparrow \frac{a}{b} \right \Downarrow \quad \left \updownarrow \frac{a}{b} \right \Updownarrow$
Delimiters can be mixed, as long as \left and \right match	`\left [ 0,1 \right )` `\left \langle \psi \right |`	$\left [0,1 \right)$ $\left \langle \psi \right \|$
Use \left. and \right. if you don't want a delimiter to appear:	`\left . \frac{A}{B} \right \} \to X`	$\left . \frac{A}{B} \right \} \to X$
Size of the delimiters	`\big( \Big( \bigg( \Bigg( \dots \Bigg] \bigg] \Big] \big]/<code>`	$\big(\Big(\bigg(\Bigg(\dots \Bigg] \bigg] \Big] \big]$
	<code>\big\{ \Big\{ \bigg\{ \Bigg\{ \dots \Bigg\rangle \bigg\rangle \Big\rangle \big\rangle	$\big\{ \Big\{ \bigg\{ \Bigg\{ \dots \Bigg\rangle \bigg\rangle \Big\rangle \big\rangle$
	`\big| \Big| \bigg| \Bigg| \dots \Bigg| \bigg| \Big| \big|`	$\big\| \Big\| \bigg\| \Bigg\| \dots \Bigg\| \bigg\| \Big\| \big\|$
	`\big\lfloor \Big\lfloor \bigg\lfloor \Bigg\lfloor \dots \Bigg\rceil \bigg\rceil \Big\rceil \big\rceil`	$\big\lfloor \Big\lfloor \bigg\lfloor \Bigg\lfloor \dots \Bigg\rceil \bigg\rceil \Big\rceil \big\rceil$
	`\big\uparrow \Big\uparrow \bigg\uparrow \Bigg\uparrow \dots \Bigg\Downarrow \bigg\Downarrow \Big\Downarrow \big\Downarrow`	$\big\uparrow \Big\uparrow \bigg\uparrow \Bigg\uparrow \dots \Bigg\Downarrow \bigg\Downarrow \Big\Downarrow \big\Downarrow$
	`\big\updownarrow \Big\updownarrow \bigg\updownarrow \Bigg\updownarrow \dots \Bigg\Updownarrow \bigg\Updownarrow \Big\Updownarrow \big\Updownarrow`	$\big\updownarrow \Big\updownarrow \bigg\updownarrow \Bigg\updownarrow \dots \Bigg\Updownarrow \bigg\Updownarrow \Big\Updownarrow \big\Updownarrow$
	`\big / \Big / \bigg / \Bigg / \dots \Bigg\backslash \bigg\backslash \Big\backslash \big\backslash`	$\big / \Big / \bigg / \Bigg / \dots \Bigg\backslash \bigg\backslash \Big\backslash \big\backslash$

Equation numbering

The templates :Tl and :Tl can be used to number equations. The template :Tl can be used to refer to a numbered equation from surrounding text. For example, the following syntax:

```
{{NumBlk|:|<math>x^2 + y^2 + z^2 = 1 \,</math>|{{EquationRef|1}}}}
```

produces the following result (note the equation number in the right margin):

:NumBlk

Later on, the text can refer to this equation by its number using syntax like this:

```
As seen in equation ({{EquationNote|1}}), blah blah blah...
```

The result looks like this:

As seen in equation (:EquationNote), blah blah blah...

Note that the equation number produced by :Tl is a link that the user can click to go immediately to the cited equation.

Alphabets and typefaces

Texvc cannot render arbitrary Unicode characters. Those it can handle can be entered by the expressions below. For others, such as Cyrillic, they can be entered as Unicode or HTML entities in running text, but cannot be used in displayed formulas.

Greek alphabet

`\Alpha \Beta \Gamma \Delta \Epsilon \Zeta`	$\Alpha \Beta \Gamma \Delta \Epsilon \Zeta$
`\Eta \Theta \Iota \Kappa \Lambda \Mu`	$\Eta \Theta \Iota \Kappa \Lambda \Mu$
`\Nu \Xi \Pi \Rho \Sigma \Tau`	$\Nu \Xi \Pi \Rho \Sigma \Tau$
`\Upsilon \Phi \Chi \Psi \Omega`	$\Upsilon \Phi \Chi \Psi \Omega$
`\alpha \beta \gamma \delta \epsilon \zeta`	$\alpha \beta \gamma \delta \epsilon \zeta$
`\eta \theta \iota \kappa \lambda \mu`	$\eta \theta \iota \kappa \lambda \mu$
`\nu \xi \pi \rho \sigma \tau`	$\nu \xi \pi \rho \sigma \tau$
`\upsilon \phi \chi \psi \omega`	$\upsilon \phi \chi \psi \omega$
`\varepsilon \digamma \varkappa \varpi`	$\varepsilon \digamma \varkappa \varpi$
`\varrho \varsigma \vartheta \varphi`	$\varrho \varsigma \vartheta \varphi$

Hebrew symbols

`\aleph \beth \gimel \daleth`	$\aleph \beth \gimel \daleth$

Blackboard bold/scripts

`\mathbb{A} \mathbb{B} \mathbb{C} \mathbb{D} \mathbb{E} \mathbb{F} \mathbb{G}`	$\mathbb{A} \mathbb{B} \mathbb{C} \mathbb{D} \mathbb{E} \mathbb{F} \mathbb{G}$
`\mathbb{H} \mathbb{I} \mathbb{J} \mathbb{K} \mathbb{L} \mathbb{M}`	$\mathbb{H} \mathbb{I} \mathbb{J} \mathbb{K} \mathbb{L} \mathbb{M}$

```
\mathbb{N} \mathbb{O} \mathbb{P} \mathbb{Q} \mathbb{R}
\mathbb{S} \mathbb{T}
```
$\mathbb{N} \mathbb{O} \mathbb{P} \mathbb{Q} \mathbb{R} \mathbb{S} \mathbb{T}$

```
\mathbb{U} \mathbb{V} \mathbb{W} \mathbb{X} \mathbb{Y}
\mathbb{Z}
```
$\mathbb{U} \mathbb{V} \mathbb{W} \mathbb{X} \mathbb{Y} \mathbb{Z}$

Boldface

```
\mathbf{A} \mathbf{B} \mathbf{C} \mathbf{D} \mathbf{E}
\mathbf{F} \mathbf{G}
```
$\mathbf{A} \mathbf{B} \mathbf{C} \mathbf{D} \mathbf{E} \mathbf{F} \mathbf{G}$

```
\mathbf{H} \mathbf{I} \mathbf{J} \mathbf{K} \mathbf{L}
\mathbf{M}
```
$\mathbf{H} \mathbf{I} \mathbf{J} \mathbf{K} \mathbf{L} \mathbf{M}$

```
\mathbf{N} \mathbf{O} \mathbf{P} \mathbf{Q} \mathbf{R}
\mathbf{S} \mathbf{T}
```
$\mathbf{N} \mathbf{O} \mathbf{P} \mathbf{Q} \mathbf{R} \mathbf{S} \mathbf{T}$

```
\mathbf{U} \mathbf{V} \mathbf{W} \mathbf{X} \mathbf{Y}
\mathbf{Z}
```
$\mathbf{U} \mathbf{V} \mathbf{W} \mathbf{X} \mathbf{Y} \mathbf{Z}$

```
\mathbf{a} \mathbf{b} \mathbf{c} \mathbf{d} \mathbf{e}
\mathbf{f} \mathbf{g}
```
$\mathbf{a} \mathbf{b} \mathbf{c} \mathbf{d} \mathbf{e} \mathbf{f} \mathbf{g}$

```
\mathbf{h} \mathbf{i} \mathbf{j} \mathbf{k} \mathbf{l}
\mathbf{m}
```
$\mathbf{h} \mathbf{i} \mathbf{j} \mathbf{k} \mathbf{l} \mathbf{m}$

```
\mathbf{n} \mathbf{o} \mathbf{p} \mathbf{q} \mathbf{r}
\mathbf{s} \mathbf{t}
```
$\mathbf{n} \mathbf{o} \mathbf{p} \mathbf{q} \mathbf{r} \mathbf{s} \mathbf{t}$

```
\mathbf{u} \mathbf{v} \mathbf{w} \mathbf{x} \mathbf{y}
\mathbf{z}
```
$\mathbf{u} \mathbf{v} \mathbf{w} \mathbf{x} \mathbf{y} \mathbf{z}$

```
\mathbf{0} \mathbf{1} \mathbf{2} \mathbf{3} \mathbf{4}
\mathbf{5} \mathbf{6} \mathbf{7} \mathbf{8} \mathbf{9}
```
$\mathbf{0} \mathbf{1} \mathbf{2} \mathbf{3} \mathbf{4} \mathbf{5} \mathbf{6} \mathbf{7} \mathbf{8} \mathbf{9}$

Boldface (Greek)

```
\boldsymbol{\Alpha} \boldsymbol{\Beta} \boldsymbol{\Gamma}
\boldsymbol{\Delta} \boldsymbol{\Epsilon} \boldsymbol{\Zeta}
```
$\boldsymbol{\Alpha} \boldsymbol{\Beta} \boldsymbol{\Gamma} \boldsymbol{\Delta} \boldsymbol{\Epsilon} \boldsymbol{\Zeta}$

```
\boldsymbol{\Eta} \boldsymbol{\Theta} \boldsymbol{\Iota}
\boldsymbol{\Kappa} \boldsymbol{\Lambda} \boldsymbol{\Mu}
```
$\boldsymbol{\Eta} \boldsymbol{\Theta} \boldsymbol{\Iota} \boldsymbol{\Kappa} \boldsymbol{\Lambda} \boldsymbol{\Mu}$

```
\boldsymbol{\Nu} \boldsymbol{\Xi} \boldsymbol{\Pi}
\boldsymbol{\Rho} \boldsymbol{\Sigma} \boldsymbol{\Tau}
```
$\boldsymbol{\Nu} \boldsymbol{\Xi} \boldsymbol{\Pi} \boldsymbol{\Rho} \boldsymbol{\Sigma} \boldsymbol{\Tau}$

```
\boldsymbol{\Upsilon} \boldsymbol{\Phi} \boldsymbol{\Chi}
\boldsymbol{\Psi} \boldsymbol{\Omega}
```
$\boldsymbol{\Upsilon} \boldsymbol{\Phi} \boldsymbol{\Chi} \boldsymbol{\Psi} \boldsymbol{\Omega}$

```
\boldsymbol{\alpha} \boldsymbol{\beta} \boldsymbol{\gamma}
\boldsymbol{\delta} \boldsymbol{\epsilon} \boldsymbol{\zeta}
```
$\boldsymbol{\alpha} \boldsymbol{\beta} \boldsymbol{\gamma} \boldsymbol{\delta} \boldsymbol{\epsilon} \boldsymbol{\zeta}$

```
\boldsymbol{\eta} \boldsymbol{\theta} \boldsymbol{\iota}
\boldsymbol{\kappa} \boldsymbol{\lambda} \boldsymbol{\mu}
```
$\boldsymbol{\eta} \boldsymbol{\theta} \boldsymbol{\iota} \boldsymbol{\kappa} \boldsymbol{\lambda} \boldsymbol{\mu}$

```
\boldsymbol{\nu} \boldsymbol{\xi} \boldsymbol{\pi}
\boldsymbol{\rho} \boldsymbol{\sigma} \boldsymbol{\tau}
```
$\boldsymbol{\nu} \boldsymbol{\xi} \boldsymbol{\pi} \boldsymbol{\rho} \boldsymbol{\sigma} \boldsymbol{\tau}$

```
\boldsymbol{\upsilon} \boldsymbol{\phi} \boldsymbol{\chi}
\boldsymbol{\psi} \boldsymbol{\omega}
```
$\boldsymbol{\upsilon} \boldsymbol{\phi} \boldsymbol{\chi} \boldsymbol{\psi} \boldsymbol{\omega}$

```
\boldsymbol{\varepsilon} \boldsymbol{\digamma}
\boldsymbol{\varkappa} \boldsymbol{\varpi}
```
$\boldsymbol{\varepsilon} \boldsymbol{\digamma} \boldsymbol{\varkappa} \boldsymbol{\varpi}$

```
\boldsymbol{\varrho} \boldsymbol{\varsigma}
\boldsymbol{\vartheta} \boldsymbol{\varphi}
```
$\boldsymbol{\varrho} \boldsymbol{\varsigma} \boldsymbol{\vartheta} \boldsymbol{\varphi}$

Italics (default for Latin alphabet)

```
\mathit{0} \mathit{1} \mathit{2} \mathit{3} \mathit{4}
\mathit{5} \mathit{6} \mathit{7} \mathit{8} \mathit{9}
```
$\mathit{0} \mathit{1} \mathit{2} \mathit{3} \mathit{4} \mathit{5} \mathit{6} \mathit{7} \mathit{8} \mathit{9}$

Greek italics (default for lowercase Greek)

```
\mathit{\Alpha} \mathit{\Beta} \mathit{\Gamma} \mathit{\Delta}
\mathit{\Epsilon} \mathit{\Zeta}
\mathit{\Eta} \mathit{\Theta} \mathit{\Iota} \mathit{\Kappa}
\mathit{\Lambda} \mathit{\Mu}
\mathit{\Nu} \mathit{\Xi} \mathit{\Pi} \mathit{\Rho}
\mathit{\Sigma} \mathit{\Tau}
\mathit{\Upsilon} \mathit{\Phi} \mathit{\Chi} \mathit{\Psi}
\mathit{\Omega}
```

$\mathit{\Alpha} \mathit{\Beta} \mathit{\Gamma} \mathit{\Delta} \mathit{\Epsilon} \mathit{\Zeta}$
$\mathit{\Eta} \mathit{\Theta} \mathit{\Iota} \mathit{\Kappa} \mathit{\Lambda} \mathit{\Mu}$
$\mathit{\Nu} \mathit{\Xi} \mathit{\Pi} \mathit{\Rho} \mathit{\Sigma} \mathit{\Tau}$
$\mathit{\Upsilon} \mathit{\Phi} \mathit{\Chi} \mathit{\Psi} \mathit{\Omega}$

Roman typeface

```
\mathrm{A} \mathrm{B} \mathrm{C} \mathrm{D} \mathrm{E}
\mathrm{F} \mathrm{G}
\mathrm{H} \mathrm{I} \mathrm{J} \mathrm{K} \mathrm{L}
\mathrm{M}
\mathrm{N} \mathrm{O} \mathrm{P} \mathrm{Q} \mathrm{R}
\mathrm{S} \mathrm{T}
\mathrm{U} \mathrm{V} \mathrm{W} \mathrm{X} \mathrm{Y}
\mathrm{Z}
\mathrm{a} \mathrm{b} \mathrm{c} \mathrm{d} \mathrm{e}
\mathrm{f} \mathrm{g}
\mathrm{h} \mathrm{i} \mathrm{j} \mathrm{k} \mathrm{l}
\mathrm{m}
\mathrm{n} \mathrm{o} \mathrm{p} \mathrm{q} \mathrm{r}
\mathrm{s} \mathrm{t}
\mathrm{u} \mathrm{v} \mathrm{w} \mathrm{x} \mathrm{y}
\mathrm{z}
\mathrm{0} \mathrm{1} \mathrm{2} \mathrm{3} \mathrm{4}
\mathrm{5} \mathrm{6} \mathrm{7} \mathrm{8} \mathrm{9}
```

$\mathrm{A} \mathrm{B} \mathrm{C} \mathrm{D} \mathrm{E} \mathrm{F} \mathrm{G}$
$\mathrm{H} \mathrm{I} \mathrm{J} \mathrm{K} \mathrm{L} \mathrm{M}$
$\mathrm{N} \mathrm{O} \mathrm{P} \mathrm{Q} \mathrm{R} \mathrm{S} \mathrm{T}$
$\mathrm{U} \mathrm{V} \mathrm{W} \mathrm{X} \mathrm{Y} \mathrm{Z}$
$\mathrm{a} \mathrm{b} \mathrm{c} \mathrm{d} \mathrm{e} \mathrm{f} \mathrm{g}$
$\mathrm{h} \mathrm{i} \mathrm{j} \mathrm{k} \mathrm{l} \mathrm{m}$
$\mathrm{n} \mathrm{o} \mathrm{p} \mathrm{q} \mathrm{r} \mathrm{s} \mathrm{t}$
$\mathrm{u} \mathrm{v} \mathrm{w} \mathrm{x} \mathrm{y} \mathrm{z}$
$\mathrm{0} \mathrm{1} \mathrm{2} \mathrm{3} \mathrm{4}$
$\mathrm{5} \mathrm{6} \mathrm{7} \mathrm{8} \mathrm{9}$

Sans serif

```
\mathsf{A} \mathsf{B} \mathsf{C} \mathsf{D} \mathsf{E}
\mathsf{F} \mathsf{G}
\mathsf{H} \mathsf{I} \mathsf{J} \mathsf{K} \mathsf{L}
\mathsf{M}
\mathsf{N} \mathsf{O} \mathsf{P} \mathsf{Q} \mathsf{R}
\mathsf{S} \mathsf{T}
\mathsf{U} \mathsf{V} \mathsf{W} \mathsf{X} \mathsf{Y}
\mathsf{Z}
\mathsf{a} \mathsf{b} \mathsf{c} \mathsf{d} \mathsf{e}
\mathsf{f} \mathsf{g}
\mathsf{h} \mathsf{i} \mathsf{j} \mathsf{k} \mathsf{l}
\mathsf{m}
\mathsf{n} \mathsf{o} \mathsf{p} \mathsf{q} \mathsf{r}
\mathsf{s} \mathsf{t}
\mathsf{u} \mathsf{v} \mathsf{w} \mathsf{x} \mathsf{y}
\mathsf{z}
\mathsf{0} \mathsf{1} \mathsf{2} \mathsf{3} \mathsf{4}
\mathsf{5} \mathsf{6} \mathsf{7} \mathsf{8} \mathsf{9}
```

$\mathsf{A} \mathsf{B} \mathsf{C} \mathsf{D} \mathsf{E} \mathsf{F} \mathsf{G}$
$\mathsf{H} \mathsf{I} \mathsf{J} \mathsf{K} \mathsf{L} \mathsf{M}$
$\mathsf{N} \mathsf{O} \mathsf{P} \mathsf{Q} \mathsf{R} \mathsf{S} \mathsf{T}$
$\mathsf{U} \mathsf{V} \mathsf{W} \mathsf{X} \mathsf{Y} \mathsf{Z}$
$\mathsf{a} \mathsf{b} \mathsf{c} \mathsf{d} \mathsf{e} \mathsf{f} \mathsf{g}$
$\mathsf{h} \mathsf{i} \mathsf{j} \mathsf{k} \mathsf{l} \mathsf{m}$
$\mathsf{n} \mathsf{o} \mathsf{p} \mathsf{q} \mathsf{r} \mathsf{s} \mathsf{t}$
$\mathsf{u} \mathsf{v} \mathsf{w} \mathsf{x} \mathsf{y} \mathsf{z}$
$\mathsf{0} \mathsf{1} \mathsf{2} \mathsf{3} \mathsf{4}$
$\mathsf{5} \mathsf{6} \mathsf{7} \mathsf{8} \mathsf{9}$

Calligraphy/script

```
\mathcal{A} \mathcal{B} \mathcal{C} \mathcal{D} \mathcal{E} \mathcal{F} \mathcal{G}
\mathcal{H} \mathcal{I} \mathcal{J} \mathcal{K} \mathcal{L} \mathcal{M}
\mathcal{N} \mathcal{O} \mathcal{P} \mathcal{Q} \mathcal{R} \mathcal{S} \mathcal{T}
\mathcal{U} \mathcal{V} \mathcal{W} \mathcal{X} \mathcal{Y} \mathcal{Z}
```

$\mathcal{A} \mathcal{B} \mathcal{C} \mathcal{D} \mathcal{E} \mathcal{F} \mathcal{G}$
$\mathcal{H} \mathcal{I} \mathcal{J} \mathcal{K} \mathcal{L} \mathcal{M}$
$\mathcal{N} \mathcal{O} \mathcal{P} \mathcal{Q} \mathcal{R} \mathcal{S} \mathcal{T}$
$\mathcal{U} \mathcal{V} \mathcal{W} \mathcal{X} \mathcal{Y} \mathcal{Z}$

Fraktur typeface

```
\mathfrak{A} \mathfrak{B} \mathfrak{C} \mathfrak{D} \mathfrak{E} \mathfrak{F} \mathfrak{G}
\mathfrak{H} \mathfrak{I} \mathfrak{J} \mathfrak{K} \mathfrak{L} \mathfrak{M}
\mathfrak{N} \mathfrak{O} \mathfrak{P} \mathfrak{Q} \mathfrak{R} \mathfrak{S} \mathfrak{T}
\mathfrak{U} \mathfrak{V} \mathfrak{W} \mathfrak{X} \mathfrak{Y} \mathfrak{Z}
\mathfrak{a} \mathfrak{b} \mathfrak{c} \mathfrak{d} \mathfrak{e} \mathfrak{f} \mathfrak{g}
\mathfrak{h} \mathfrak{i} \mathfrak{j} \mathfrak{k} \mathfrak{l} \mathfrak{m}
\mathfrak{n} \mathfrak{o} \mathfrak{p} \mathfrak{q} \mathfrak{r} \mathfrak{s} \mathfrak{t}
\mathfrak{u} \mathfrak{v} \mathfrak{w} \mathfrak{x} \mathfrak{y} \mathfrak{z}
\mathfrak{0} \mathfrak{1} \mathfrak{2} \mathfrak{3} \mathfrak{4}
\mathfrak{5} \mathfrak{6} \mathfrak{7} \mathfrak{8} \mathfrak{9}
```

$\mathfrak{A} \mathfrak{B} \mathfrak{C} \mathfrak{D} \mathfrak{E} \mathfrak{F} \mathfrak{G}$
$\mathfrak{H} \mathfrak{I} \mathfrak{J} \mathfrak{K} \mathfrak{L} \mathfrak{M}$
$\mathfrak{N} \mathfrak{O} \mathfrak{P} \mathfrak{Q} \mathfrak{R} \mathfrak{S} \mathfrak{T}$
$\mathfrak{U} \mathfrak{V} \mathfrak{W} \mathfrak{X} \mathfrak{Y} \mathfrak{Z}$
$\mathfrak{a} \mathfrak{b} \mathfrak{c} \mathfrak{d} \mathfrak{e} \mathfrak{f} \mathfrak{g}$
$\mathfrak{h} \mathfrak{i} \mathfrak{j} \mathfrak{k} \mathfrak{l} \mathfrak{m}$
$\mathfrak{n} \mathfrak{o} \mathfrak{p} \mathfrak{q} \mathfrak{r} \mathfrak{s} \mathfrak{t}$
$\mathfrak{u} \mathfrak{v} \mathfrak{w} \mathfrak{x} \mathfrak{y} \mathfrak{z}$
$\mathfrak{0} \mathfrak{1} \mathfrak{2} \mathfrak{3} \mathfrak{4}$
$\mathfrak{5} \mathfrak{6} \mathfrak{7} \mathfrak{8} \mathfrak{9}$

Mixed text faces

Feature	Syntax	How it looks rendered	
Non-italicised characters	`\text{xyz}`	xyz	xyz
Mixed italics (bad)	`\text{if} n \text{is even}`	if$n$is even	if$n$is even
Mixed italics (good)	`\text{if }n\text{ is even}`	if n is even	if n is even
Mixed italics (alternative: ~ or "\ " forces a space)	`\text{if}~n\ \text{is even}`	if n is even	if n is even

Color

Equations can use color:

- `{\color{Blue}x^2}+{\color{YellowOrange}2x}-{\color{OliveGreen}1}` $\color{Blue}x^2}+{\color{YellowOrange}2x}-{\color{OliveGreen}1$
- `x_{1,2}=\frac{-b\pm\sqrt{\color{Red}b^2-4ac}}{2a}` $x_{1,2}=\frac{-b\pm\sqrt{\color{Red}b^2-4ac}}{2a}$

It is also possible to change the background color (since r59550), as in the following example:

Background	Wikicode	Rendering (in PNG)
White	`e^{i \pi} + 1 = 0`	$e^{i\pi} + 1 = 0$
	`\definecolor{orange}{RGB}{255,165,0}\pagecolor{orange}`	$e^{i\pi} + 1 = 0$
	`e^{i \pi} + 1 = 0`	
Orange	`e^{i \pi} + 1 = 0`	$e^{i\pi} + 1 = 0$
	`\definecolor{orange}{RGB}{255,165,0}\pagecolor{orange}`	$e^{i\pi} + 1 = 0$
	`e^{i \pi} + 1 = 0`	

Colors supported

Apricot	Aquamarine	Bittersweet	Black
Blue	BlueGreen	BlueViolet	BrickRed
Brown	BurntOrange	CadetBlue	CarnationPink
Cerulean	CornflowerBlue	Cyan	Dandelion
DarkOrchid	Emerald	ForestGreen	Fuchsia
Goldenrod	Gray	Green	GreenYellow
JungleGreen	Lavender	LimeGreen	Magenta
Mahogany	Maroon	Melon	MidnightBlue
Mulberry	NavyBlue	OliveGreen	Orange
OrangeRed	Orchid	Peach	Periwinkle
PineGreen	Plum	ProcessBlue	Purple
RawSienna	Red	RedOrange	RedViolet
Rhodamine	RoyalBlue	RoyalPurple	RubineRed
Salmon	SeaGreen	Sepia	SkyBlue
SpringGreen	Tan	TealBlue	Thistle
Turquoise	Violet	VioletRed	White
WildStrawberry	Yellow	YellowGreen	YellowOrange

Note that color should not be used as the *only* way to identify something, because it will become meaningless on black-and-white media or for color-blind people. See Wikipedia:Manual of Style (accessibility)#Color.

Formatting issues

Spacing

Note that :TeX handles most spacing automatically, but you may sometimes want manual control.

Feature	Syntax	How it looks rendered
double quad space	`a \qquad b`	$a \qquad b$
quad space	`a \quad b`	$a \quad b$
text space	`a\ b`	$a\ b$
text space without PNG conversion	`a \mbox{ } b`	$a\ b$
large space	`a\;b`	$a\;b$
medium space	`a\>b`	[not supported]
small space	`a\,b`	$a\,b$

no space	`ab`	ab
small negative space	`a\!b`	$a\!b$

Automatic spacing may be broken in very long expressions (because they produce an overfull hbox in :TeX):

```
<math>0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots</math>
```
$0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots$

This can be remedied by putting a pair of braces { } around the whole expression:

```
<math>{0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots}</mat
h>
```
$0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots$

Alignment with normal text flow

Due to the default CSS

<source lang="CSS">img.tex { vertical-align: middle; }</source>

an inline expression like $\int_{-N}^{N} e^x\,dx$ should look good.

If you need to align it otherwise, use `<math style="vertical-align:-100%;">...</math>` and play with the `vertical-align` argument until you get it right; however, how it looks may depend on the browser and the browser settings.

Also note that if you rely on this workaround, if/when the rendering on the server gets fixed in future releases, as a result of this extra manual offset your formulae will suddenly be aligned incorrectly. So use it sparingly, if at all.

Forced PNG rendering

To force the formula to render as PNG, add `\,` (small space) at the end of the formula (where it is not rendered). This will force PNG if the user is in "<mw math simple>" mode, but not for "<mw math html>" mode (math rendering settings in preferences). Notice that since MediaWiki 1.19, the only available options will be "Vždy jako PNG" and "Ponechat jako TeX (pro textové prohlížeče)".

You can also use `\,\!` (small space and negative space, which cancel out) anywhere inside the math tags. This *does* force PNG even in "HTML if possible" mode, unlike `\,`.

This could be useful to keep the rendering of formulae in a proof consistent for users who have not selected "Vždy jako PNG" (e.g., all anonymous users on wikis where `$wgDefaultUserOptions['math']` is not set to 0), for example, or to fix formulae that render incorrectly in HTML (at one time, `a^{2+2}` rendered with an extra underscore), or to demonstrate how something is rendered when it would normally show up as HTML (as in the examples above).

For instance:

Syntax	How it looks rendered

`a^{c+2}`	a^{c+2}
`a^{c+2} \,`	a^{c+2}
`a^{\,\!c+2}`	a^{c+2}
`a^{b^{c+2}}`	$a^{b^{c+2}}$ (WRONG with option "HTML if possible or else PNG"!)
`a^{b^{c+2}} \,`	$a^{b^{c+2}}$ (WRONG with option "HTML if possible or else PNG"!)
`a^{b^{c+2}}\approx 5`	$a^{b^{c+2}} \approx 5$ (due to "≈" correctly displayed, no code "\,\!" needed)
`a^{b^{\,\!c+2}}`	$a^{b^{c+2}}$
`\int_{-N}^{N} e^x\, dx`	$\int_{-N}^{N} e^x\, dx$

This has been tested with most of the formulae on this page, and seems to work perfectly.

You might want to include a comment in the HTML so people don't "correct" the formula by removing it:

> *<!-- The \,\! is to keep the formula rendered as PNG instead of HTML. Please don't remove it. -->*

Alternatively, you could create a template called "Don't remove the \,\!" to be able to use a category or Special:WhatLinksHere to track the usage of this hack.

Commutative diagrams

To make a commutative diagram, there are three steps:

1. write the diagram in TeX
2. convert to SVG
3. upload the file to Wikimedia Commons

Diagrams in :TeX

Xy-pic (online manual) is the most powerful and general-purpose diagram package in TeX.

Simpler packages include:

- AMS's amscd
- Paul Taylor's diagrams
- François Borceux Diagrams

The following is a template for Xy-pic, together with a hack to increase the margins in dvips, so that the diagram is not truncated by over-eager cropping (suggested in TUGboat: TUGboat, Volume 17 1996, No. 3):

```
\documentclass{amsart}
\usepackage[all, ps, dvips]{xy} % Loading the XY-Pic package
 % Using postscript driver for smoother curves
\usepackage{color} % For invisible frame
\begin{document}
```

```
\thispagestyle{empty} % No page numbers
\SelectTips{eu}{} % Euler arrowheads (tips)
\setlength{\fboxsep}{0pt} % Frame box margin
{\color{white}\framebox{{\color{black}$$ % Frame for margin

\xymatrix{ % The diagram is a 3x3 matrix
%%% Diagram goes here %%%
}

$$}}} % end math, end frame
\end{document}
```

Convert to SVG

Once you have produced your diagram in LaTeX (or TeX), you can convert it to an SVG file using the following sequence of commands:

```
pdflatex file.tex
pdfcrop --clip file.pdf tmp.pdf
pdf2svg tmp.pdf file.svg
(rm tmp.pdf at the end)
```

If you do not have pdflatex (which is unlikely) you can also use the commands

```
latex file.tex
dvipdfm file.dvi
```

to get a PDF version of your diagram. The pdfcrop and pdf2svg utilities are needed for this procedure.

In general, you will not be able to get anywhere with diagrams without :TeX and Ghostscript, and the `inkscape` program is a useful tool for creating or modifying your diagrams by hand. There is also a utility `pstoedit` which supports direct conversion from Postscript files to many vector graphics formats, but it requires a non-free plugin to convert to SVG, and regardless of the format, this editor has not been successful in using it to convert diagrams with diagonal arrows from TeX-created files.

These programs are:

- a working :TeX distribution, such as TeX Live
- Ghostscript
- pstoedit
- Inkscape

Upload the file

:See also :See also

As the diagram is your own work, upload it to Wikimedia Commons, so that all projects (notably, all languages) can use it without having to copy it to their language's Wiki. (If you've previously uploaded a file to somewhere other than Commons, to Commons.)

Check size
: Before uploading, check that the default size of the image is neither too large nor too small by opening in an SVG application and viewing at default size (100% scaling), otherwise adjust the `-y` option to `dvips`.

Name
: Make sure the file has a meaningful name.

Upload
: Login to Wikimedia Commons, then upload the file; for the **Summary**, give a brief description.

Now go to the image page and add a description, including the **source code**, using this template:

```
{{Information
|Description =
{{en| Description [[:en:Link to WP page|topic]]
}}
|Source=Created as per: [[:en:meta:Help:Displaying a formula#Commutative
diagrams]]
<pre>
% TeX source here
</pre>
|Date = The Creation Date, like 1999-12-31
|Author = [[User:YourUserName|Your Real Name]]
|Permission = {{self|PD-self (or other license)|author=
[[User:YourUserName|Your Real Name]]}}
}}

[[Category:Commutative diagrams]]
```

Source code

- Include the source code in the image page, in the `Source` section of the `Information` template, so that the diagram can be edited in future.
- Include the complete `.tex` file, not just the fragment, so future editors do not need to reconstruct a compilable file.
- (Don't include it in the Summary section, which is just supposed to be a summary.)

License
: The most common license for commutative diagrams is `PD-self`; some use `PD-ineligible`, especially for simple diagrams, or other licenses. Please *do not* use the GFDL, as it requires the entire text of the GFDL to be attached to any document that uses the diagram.

Description
: If possible, link to a Wikipedia page relevant to the diagram.

Category
: Include `[[Category:Commutative diagrams]]`, so that it appears in commons:Category:Commutative diagrams. There are also subcategories, which you may choose to use.

Include image
: Now include the image on the original page via `[[Image:Diagram.svg]]`

Examples

A sample conforming diagram is commons:Image:PSU-PU.svg.

Unimplemented elements and workarounds

`\oiint` and `\oiiint`

Elements which are not yet implemented are `\oiint`, a two-fold integral `\iint` :Nowrap with a circular curve through the centre of the two integrals, and similarly `\oiiint`, a circular curve through three integrals. In contrast, `\oint` :Nowrap exists for the single dimension (integration over a curved line within a plane or any space with higher dimension).

These elements appear in many contexts: `\oiint` denotes a surface integral over the closed 2d boundary of a 3d region (which occurs in much of 3d vector calculus and physical applications – like Maxwell's equations), likewise `\oiiint` denotes integration over the closed 3d boundary (surface volume) of a 4d region, and they would be strong candidates for the next :TeX version. As such there are a lot of workarounds in the present version.

`\oiint` and `\oiiint` using currently implemented symbols

`\oiint` looks like:

$$\oiint_S \mathbf{D} \cdot \mathrm{d}\mathbf{A}$$

• , which uses `\iint` along with `\subset` and `\supset` (overdrawn after backspacing):

```
<math>\iint\limits_{S}\!\!\!\!\!\!\!\!\!\!\!\!\!\subset\!\supset \mathbf D
\cdot \mathrm{d}\mathbf A</math>
```

$$\oint\!\!\!\int_{\partial V} \mathbf{D} \cdot \mathrm{d}\mathbf{A}$$

• , which uses `\int` twice (with some backward kerning) along with `\bigcirc` (also overdrawn after backpacing) to produce a more consistent circle:

```
<math>\int\!\!\!\int_{\partial
V}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\;\;\;\bigcirc\,\,\mathbf
D\cdot\mathrm{d}\mathbf A</math>
```

`\oiiint` (should also be preferably more tightly kerned) looks more or less like:

$$\oiiint_{\partial V} \mathbf{D} \cdot \mathrm{d}\mathbf{A}$$

• which uses three \int symbols (with more backward kerning) with \subset and \supset (overdrawn after backspacing):

```
<math>\int\!\!\!\int\!\!\!\int_{\partial
V}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\;\;\;\subset\!\supset \mathbf
D\;\cdot\mathrm{d}\mathbf A</math>
```

$$\oiiint_{\partial V} \mathbf{D} \cdot \mathrm{d}\mathbf{A}$$

• , which uses three `\int` symbols (with more backward kerning) along with `\bigcirc` (also overdrawn after backspacing):

```
<math>\int\!\!\!\int\!\!\!\int_{\partial
V}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\;\;\;\bigcirc\,\,\mathbf
D\;\cdot\mathrm{d}\mathbf A</math>
```

However, since no standardisation exists as yet, any workaround like this (which uses many `\!` symbols for backspacing) should be avoided, if possible. See below for a possibility using PNG image enforcement.

Note that `\iint` (the double integral) and `\iiint` (the triple integral) are still not kerned as they should preferably be, and are currently rendered as if they were successive `\int` symbols ; this is not a major problem for reading the formulas, even if the integral symbols before the last one do not have bounds, so it's best to avoid backspacing "hacks" as they may be inconsistent with a possible future better implementation of integrals symbols (with more precisely computed kerning positions).

`\oiint` and `\oiiint` as PNG images

These symbols are available as PNG images which are also integrated into two templates, :Tl and :Tl, which take care of the formatting around the symbols.

The templates have three parameters:

- **preintegral** the text or formula immediately before the integral
- **intsubscpt** the subscript below the integral
- **integrand** the text or formula immediately after the integral

Examples

- Stoke's theorem: `{{oiint | intsubscpt = <math>{\scriptstyle S}</math> | integrand=<math>( \nabla \times \bold{F} ) \cdot {\rm d}\bold{S} = \oint_{\partial S} \bold{F} \cdot {\rm d}\boldsymbol{\ell} </math> }}`

  :Oiint

- Ampère's law + correction: `{{oiint | preintegral=<math>\oint_C \bold{B} \cdot {\rm d} \boldsymbol{\ell} = \mu_0 </math> | intsubscpt = <math>{\scriptstyle S}</math> | integrand = <math>\left ( \bold{J} + \epsilon_0\frac{\partial \bold{E}}{\partial t} \right ) \cdot {\rm d}\bold{S}</math> }}`

  :Oiint

- Continuity of 4-momentum flux (in general relativity):[1] `{{oiiint | preintegral=<math>\bold{P} = </math> | intsubscpt = <math>{\scriptstyle \partial \Omega}</math> | integrand = <math>\bold{T} \cdot {\rm d}^3\boldsymbol{\Sigma} = 0</math> }}`

  :Oiiint

Oriented `\oiint` and `\oiiint` as PNG images

Some variants of `\oiint` and `\oiiint` have arrows on them to indicate the sense of integration, such as a line integral around a closed curve in the clockwise sense, and higher dimensional analogues. These are not implemented in :TEX on Wikipedia either, although the template :Tl is available - see link for details.

`\overarc`

`\overarc` is not yet implemented to display the arc notation. However, there exists a workaround:

use `\overset{\frown}{AB}`, which gives
$\overset{\frown}{AB}$

Enforcing PNG images?

Moreover, although for other symbols the html substitute does not show a similar bug, the corresponding text should be looked upon very critically, since the HTML-symbols, although not obviously wrong, may look rather ugly to some, so that an enforced PNG-image is often preferable.

However, generally image-enforcing should be avoided. Often the best choice is to use neither :TeX symbols nor the HTML substitutes, but instead the simple ASCII symbols offered by a standard keyboard: a good example is the quantity velocity, which might be given in :TeX (if necessary with an enforcement) by v, with the HTML substitute v (which, by the way, should not be mixed up with the Greek letter "\nu" ν), and the ASCII letters *v* or *V* (i.e., one puts, at first, two primes for italic style, followed by the simple ASCII letter v or V, finally again two primes).

For vector or tensor quantities, one can use again ASCII letters plus three primes for bold printing.

Note also that the default HTML rendering of mathematic expressions (when they are possible) uses the default text font, weight, style and size for variable names. Some mathematical expressions need differences between these styles; for consistency with the more complex formulas using the same variables that can be rendered only as PNG, it may be necessary to enforce the PNG rendering also for isolated variables found in the article text (using one of the special :TeX spaces that remain invisible on the left or right of the expression and that force the PNG rendering wherever they occur in the expression, notably the :TeX backspace "\!").

Examples of implemented :TeX formulas

Quadratic polynomial

$ax^2 + bx + c = 0$

```
<math>ax^2 + bx + c = 0</math>
```

Quadratic formula

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

```
<math>x={-b\pm\sqrt{b^2-4ac} \over 2a}</math>
```

Tall parentheses and fractions

$2 = \left(\frac{(3-x) \times 2}{3-x}\right)$

```
<math>2 = \left(
 \frac{\left(3-x\right) \times 2}{3-x}
 \right)</math>
```

$$S_{\text{new}} = S_{\text{old}} - \frac{(5-T)^2}{2}$$

```
 <math>S_{\text{new}} = S_{\text{old}} - \frac{ \left( 5-T \right) ^2}
{2}</math>
```

Integrals

$$\int_a^x \int_a^s f(y)\,dy\,ds = \int_a^x f(y)(x-y)\,dy$$

```
<math>\int_a^x \!\!\!\int_a^s f(y)\,dy\,ds
 = \int_a^x f(y)(x-y)\,dy</math>
```

Matrices and determinants

$$\det(\mathsf{A}-\lambda\mathsf{I}) = 0$$

```
<math>\det(\mathsf{A}-\lambda\mathsf{I}) = 0</math>
```

Summation

$$\sum_{i=0}^{n-1} i$$

```
<math>\sum_{i=0}^{n-1} i</math>
```

$$\sum_{m=1}^{\infty}\sum_{n=1}^{\infty}\frac{m^2\,n}{3^m\left(m\,3^n+n\,3^m\right)}$$

```
<math>\sum_{m=1}^\infty\sum_{n=1}^\infty\frac{m^2\,n}
 {3^m\left(m\,3^n+n\,3^m\right)}</math>
```

Differential equation

$$u'' + p(x)u' + q(x)u = f(x), \quad x > a$$

```
<math>u'' + p(x)u' + q(x)u=f(x),\quad x>a</math>
```

Complex numbers

$$|\bar{z}| = |z|, |(\bar{z})^n| = |z|^n, \arg(z^n) = n\arg(z)$$

```
<math>|\bar{z}| = |z|,
 |(\bar{z})^n| = |z|^n,
 \arg(z^n) = n \arg(z)</math>
```

Limits

$$\lim_{z \to z_0} f(z) = f(z_0)$$

```
<math>\lim_{z\rightarrow z_0} f(z)=f(z_0)</math>
```

Integral equation

$$\phi_n(\kappa) = \frac{1}{4\pi^2\kappa^2} \int_0^\infty \frac{\sin(\kappa R)}{\kappa R} \frac{\partial}{\partial R} \left[R^2 \frac{\partial D_n(R)}{\partial R} \right] \, dR$$

```
<math>\phi_n(\kappa) =
 \frac{1}{4\pi^2\kappa^2} \int_0^\infty
 \frac{\sin(\kappa R)}{\kappa R}
 \frac{\partial}{\partial R}
 \left[R^2\frac{\partial D_n(R)}{\partial R}\right]\,dR</math>
```

Example

$$\phi_n(\kappa) = 0.033 C_n^2 \kappa^{-11/3}, \quad \frac{1}{L_0} \ll \kappa \ll \frac{1}{l_0}$$

```
<math>\phi_n(\kappa) =
 0.033C_n^2\kappa^{-11/3},\quad
 \frac{1}{L_0}\ll\kappa\ll\frac{1}{l_0}</math>
```

Continuation and cases

$$f(x) = \begin{cases} 1 & -1 \le x < 0 \\ \frac{1}{2} & x = 0 \\ 1 - x^2 & \text{otherwise} \end{cases}$$

```
<math>
 f(x) =
 \begin{cases}
 1 & -1 \le x < 0 \\
 \frac{1}{2} & x = 0 \\
 1 - x^2 & \text{otherwise}
 \end{cases}
 </math>
```

Prefixed subscript

$${}_pF_q(a_1,\ldots,a_p;c_1,\ldots,c_q;z) = \sum_{n=0}^{\infty} \frac{(a_1)_n \cdots (a_p)_n}{(c_1)_n \cdots (c_q)_n} \frac{z^n}{n!}$$

```
 <math>{}_pF_q(a_1,\dots,a_p;c_1,\dots,c_q;z)
 = \sum_{n=0}^\infty
 \frac{(a_1)_n\cdots(a_p)_n}{(c_1)_n\cdots(c_q)_n}
 \frac{z^n}{n!}</math>
```

Fraction and small fraction

$\frac{a}{b}\ \tfrac{a}{b}$
$\frac{a}{b}\ \tfrac{a}{b}$

Area of a quadrilateral

$S = dD\,\sin\alpha\!$
$S=dD\,\sin\alpha\!$

Volume of a sphere-stand

$V = \frac{1}{6}\pi h\left[3\left(r_1^2+r_2^2\right)+h^2\right]$
$V=\frac16\pi h\left[3\left(r_1^2+r_2^2\right)+h^2\right]$

Multiple equations

$$u = \tfrac{1}{\sqrt{2}}(x+y) \qquad x = \tfrac{1}{\sqrt{2}}(u+v)$$
$$v = \tfrac{1}{\sqrt{2}}(x-y) \qquad y = \tfrac{1}{\sqrt{2}}(u-v)$$

```
<math>\begin{align}
  u & = \tfrac{1}{\sqrt{2}}(x+y) \qquad & x &= \tfrac{1}{\sqrt{2}}(u+v) \\
  v & = \tfrac{1}{\sqrt{2}}(x-y) \qquad & y &= \tfrac{1}{\sqrt{2}}(u-v)
 \end{align}</math>
```

References

:Reflist

See also

- Typesetting of mathematical formulae
- Proposed m:Music markup and Help:Musical symbols
- Table of mathematical symbols
- mw:Extension:Blahtex, or blahtex: a LaTeX to MathML converter for Wikipedia
- commons:Category:Images which should use TeX

External links

:Wikibooks

- A LaTeX tutorial
- :Citation. A paper introducing TeX — see page 39 onwards for a good introduction to the maths side of things.
- :Citation. A paper introducing LaTeX — skip to page 49 for the math section. See page 63 for a complete reference list of symbols included in LaTeX and AMS-LaTeX.
- The Comprehensive LaTeX Symbol List—symbols not found here may be documented there.

- Long list of many symbols
- short list of common symbols
- The esint package for closed double integrals
- The esint package for closed double integrals
- cancel package
- AMS-LaTeX guide.
- A set of public domain fixed-size math symbol bitmaps.
- MathML: A product of the W3C Math working group, is a low-level specification for describing mathematics as a basis for machine to machine communication.

Chybná citace Nalezena značka `<ref>` bez příslušné značky `<references/>`.