

∞ Lato Math ∞

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<https://github.com/abccsss/LatoMath>

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1 What is Lato Math?

Lato Math is an OpenType maths font meant to be used with the Lato font, or other sans-serif text fonts. It requires LuaTeX or XeTeX as engine and the unicode-math package¹.

Please note that the current version (0.36) is *experimental*, do expect metrics and glyphs to change until version 1.0 is reached. Comments, suggestions and bug reports are welcome!

Some examples²:

$$\int_0^1 \frac{1}{x^x} dx = \sum_{n=1}^{\infty} \frac{1}{n^n}$$

$$\begin{aligned} \iiint_Q f(w, x, y, z) dw dx dy dz &\leq \oint_{\partial Q} f' \left(\max \left\{ \frac{\|w\|}{|w^2 + x^2|}, \frac{\|z\|}{|y^2 + z^2|}, \frac{\|w \oplus z\|}{|x \oplus y|} \right\} \right) \\ &\approx \bigcup_{Q \in \bar{Q}} \left[f^* \left(\frac{\int Q(t)}{\sqrt{1 - t^2}} \right) \right]_{t=\alpha}^{t=\vartheta} - (\Delta + \nu - \nu)^3 \end{aligned}$$

¹Please read the documentation unicode-math.pdf.

²The second one is borrowed from the LaTeX Companion, 3rd edition.

2 Usage

2.1 Calling `\setmathfont`

A basic call for Lato Math would be:

```
\usepackage{unicode-math}  
\setmathfont{LatoMath.otf} % Call by file name or  
\setmathfont{Lato Math}    % Call by font name
```

this loads Lato Math as maths font³ with the default options, see subsections [3.1 on page 4](#), [3.2 on page 5](#) and [3.3 on page 6](#) for customisation.

Please note that the text fonts have to be chosen separately, f.i.:

```
\setsansfont{Lato}[Extension = .ttf,  
  UprightFont =    *-Regular,  
  BoldFont =      *-Bold,  
  ItalicFont =     *-Italic,  
  BoldItalicFont = *-BoldItalic]
```

otherwise you would get Latin Modern for text fonts.

2.2 Calling `lato-math.sty` (recommended)

As an alternative to load Lato Math you can type:

```
\usepackage[ options4 ]{lato-math}
```

it loads unicode-math with the default options, sets LatoMath as maths font and does a bit more:

1. it checks at `\begin{document}` if packages `amssymb` or `latexsym` are loaded and issues warnings in case they are;

³Both calls work equally well with LuaTeX; with XeTeX a call by font name will fail unless the font is declared as a *system font*.

⁴Possible *options* are `tight`, `Scale=` or any of the options described in sections [3.1](#), [3.2](#) and [3.3](#).

2. it provides aliases for glyphs named differently in Unicode, so that all `latexsym` or `AMS` commands are also available;
3. it defines specific maths characters like `\BbbDelta` (Δ), `\parallelslant` (\parallel), `\shortparallelslant` (\parallel), etc.;
4. it provides an option `tight` which reduces spacing (`\thinmuskip`, `\medmuskip` and `\thickmuskip`) in maths mode.

Please note that the `lato-math` package does not load any text fonts. The Lato text fonts can be loaded directly (see section 2.1), or via the `lato` package⁵ —see this package’s documentation, file `lato.pdf`, for all the available options:

```
\usepackage[default]{lato}
```

will load the Lato text fonts as main (roman) font while

```
\usepackage[defaultsans]{lato}
```

will load the Lato text fonts as sans font (use both options if necessary). Consider loading `realscripts.sty` which redefines `\textsuperscript` to output the *real* superscripts available with the Lato fonts: M^r , M^{le} , N^2 instead of *faked* ones, M^r , M^{le} , N^2 .

The `lato-math` also provides a `Scale=<decimal>` option meant to be used to load the Lato Math font together with text fonts other than Lato, while keeping the advantages 1. to 4. pointed in the preceding list, f.i.

```
\usepackage[Scale=0.98]{lato-math}
```

3 What is provided?

Lato Math provides all common unicode-math glyphs plus all glyphs available in the `amssymb` and `latexsym` packages. Therefore, the latter two packages *should not* be loaded as they might override Lato Math glyphs.

A full list of available glyphs is shown in file `unimath-lato.pdf` which also shows the coverage of other sans-serif maths fonts compared to the serif maths fonts `NewComputerModern` and `Cambria`.

⁵The `lato` package loads all available weights, Hairline to Black, hence loading takes significantly longer...

3.1 Upright or slanted?

Package `unicode-math` follows \TeX conventions for Latin and Greek letters: in maths mode, the default option (`math-style=TeX`) prints Latin letters $a\dots z$ $A\dots Z$ and lowercase Greek letters $\alpha\dots\omega$ slanted (italic) while uppercase Greek letters $\text{\AA}\Gamma\dots\Omega$ are printed upright. This can be changed by option `math-style` as shown in table 1.

Table 1: Effects of the `math-style` package option.

Package option	Latin	Greek
<code>math-style=ISO</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$
<code>math-style=TeX</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$
<code>math-style=french</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$
<code>math-style=upright</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$

Bold letters are printed upright except lowercase Greek letters which are slanted (the default option is `bold-style=TeX`). This can be changed by option `bold-style` as shown in table 2.

Table 2: Effects of the `bold-style` package option.

Package option	Latin	Greek
<code>bold-style=ISO</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$
<code>bold-style=TeX</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$
<code>bold-style=upright</code>	(a, z, B, X)	$(\alpha, \beta, \Gamma, \Xi)$

Other possible customisation: ∇ is printed upright and ∂ is printed slanted by default, but `nabla=italic` and `partial=upright` can change this.

All these options are offered by the `unicode-math` package, they can be added to the `\setmathfont` call as well⁶, for example:

```
\setmathfont{LatoMath.otf}[math-style=french,partial=upright]
```

will print for the code

```
\[ \frac{\partial f}{\partial x} = \alpha \text{\textbf{\textit{V}}} + a \nabla \Gamma + \beta \text{\textbf{M}} \]
```

$$\frac{\partial f}{\partial x} = \alpha \mathbf{V} + a \nabla \Gamma + \beta \mathbf{M}$$

⁶IMHO it is easier to add *all options* to the `\setmathfont` command.

while the default settings would print

$$\frac{\partial f}{\partial x} = \alpha \mathbf{V} + a \nabla \Gamma + \beta \mathbf{M}$$

Both shapes remain available anytime: `\uppi, \itpi` prints π, π .

If your text editor is able to handle Greek letters or maths symbols, they can be entered in the code instead control sequences (i.e. $\alpha, \beta, \Gamma, \dots$ for `\alpha, \beta, \Gamma, \dots`).

3.2 Character variants

Lato Math provides nine “Character Variants” options, listed on table 3, to choose between different glyphs for Greek characters and some others.

For instance, to get `\epsilon` and `\phi` typeset as ϵ and ϕ instead of ϵ and ϕ , you can add option `CharacterVariant={3,6}` to the `\setmathfont` call:

```
\setmathfont{LatoMath.otf}[CharacterVariant={3,6}]
```

Table 3: Character variants.

	Default	Variant	Name
cv01	\hbar	\hbar	<code>\hslash</code>
cv02	\emptyset	\emptyset	<code>\emptyset</code>
cv03	ϵ	ϵ	<code>\epsilon</code>
cv04	κ	κ	<code>\kappa</code>
cv05	π	π	<code>\pi</code>
cv06	ϕ	ϕ	<code>\phi</code>
cv07	ρ	ρ	<code>\rho</code>
cv08	σ	σ	<code>\sigma</code>
cv09	θ	θ	<code>\theta</code>
cv10	Θ	Θ	<code>\Theta</code>

This works for all shapes and weights of these characters: f.i. `\symbf{\epsilon}`, `\symbf{\phi}` are output as ϵ, ϕ instead of ϵ, ϕ . If `math-style=french` has been chosen, `\epsilon` and `\phi` are output as ϵ and ϕ (upright).

Please note that curly braces are mandatory whenever more than one “Character Variant” is selected.

Note about `\hbar`: `amsmath` provides two different glyphs (italic *h* with horizontal or diagonal stroke) while `unicode-math` defines `\hbar` as `\hslash` (U+210F). LatoMath follows `unicode-math`; the italic *h* with horizontal stroke can be printed using `\hslash` or `\hbar` together with character variant `cv01` or with `\mathbar` (replacement for AMS' command `\hbar`).

3.3 Stylistic sets

Lato Math provides five “Stylistic Sets” options to choose between different glyphs for families of maths symbols.

`StylisticSet=4`, alias⁷ `Style=leqslant`, converts inequalities into their slanted variants, see table 5a.

`StylisticSet=5`, alias `Style=smaller`, converts some symbols into their smaller variants, see table 5b.

Table 4: Stylistic Sets 4 and 5

(a) <code>Style=leqslant</code> (+ss04)			(b) <code>Style=smaller</code> (+ss05)		
Command	Default	Variant	Command	Default	Variant
<code>\leq</code>	\leq	\leqslant	<code>\in</code>	\in	ϵ
<code>\geq</code>	\geq	\geqslant	<code>\ni</code>	\ni	\ni
<code>\nleq</code>	\nleq	\nleqslant	<code>\mid</code>	\mid	\mid
<code>\ngeq</code>	\ngeq	\ngeqslant	<code>\nmid</code>	\nmid	\nmid
<code>\leqq</code>	\leqq	\leqslant	<code>\parallel</code>	\parallel	\parallel
<code>\geqq</code>	\geqq	\geqslant	<code>\nparallel</code>	\nparallel	\nparallel
<code>\nleqq</code>	\nleqq	\nleqslant	<code>\parallelslant</code>	\parallel	\parallel
<code>\ngeqq</code>	\ngeqq	\ngeqslant	<code>\nparallelslant</code>	\nparallel	\nparallel
<code>\eqless</code>	\lessgtr	\lessgtr			
<code>\eqgtr</code>	\gtrless	\gtrless			
<code>\lesseqgtr</code>	\lesseqgtr	\lesseqgtr			
<code>\gtreqless</code>	\gtreqless	\gtreqless			
<code>\lesseqqgtr</code>	\lesseqqgtr	\lesseqqgtr			
<code>\gtreqqless</code>	\gtreqqless	\gtreqqless			

`StylisticSet=6`, alias `Style=subsetneq`, converts some inclusion symbols, as shown in table 6a on the following page.

⁷These Style aliases are provided by `lato-math.sty`.

StylisticSet=7, alias Style=parallelslant, converts “parallel” symbols into their slanted variants, see table 6b.

Table 5: Stylistic Sets 6 and 7

(a) Style=subsetneq (+ss06)			(b) Style=parallelslant (+ss07)		
Command	Default	Variant	Command	Default	Variant
<code>\subsetneq</code>	\subsetneq	\subsetneq	<code>\parallel</code>	\parallel	\parallel
<code>\supsetneq</code>	\supsetneq	\supsetneq	<code>\nparallel</code>	\nparallel	\nparallel
<code>\subsetneqq</code>	\subsetneqq	\subsetneqq	<code>\shortparallel</code>	\shortparallel	\shortparallel
<code>\supsetneqq</code>	\supsetneqq	\supsetneqq	<code>\nshortparallel</code>	\nshortparallel	\nshortparallel

To enable Stylistic Sets 4 and 8 for Lato Math, you should enter

```
\setmathfont{LatoMath.otf}[StylisticSet={4,8}] or
\usepackage[Style={leqslant,upint}]{lato-math}
```

then, `\[x\leq y \quad \int_a^b f(x) \, dx \; \; \; \int_a^b f(x) \, dx]` will print as

$$x \leqslant y \quad \int_a^b f(x) \, dx$$

instead of

$$x \leq y \quad \int_a^b f(x) \, dx$$

StylisticSet=8, alias⁸ Style=upint, converts integrals signs into their upright variants, see table 6 on the following page.

3.4 Other font features

To get oldstyle numbers in maths, the feature +onum is available:

```
\setmathfont{LatoMath.otf}[Numbers=OldStyle] or
\usepackage[Style=fulloldstyle]{lato-math}
```

0123456789, **0123456789**

⁸These Style aliases are provided by `lato-math.sty`.

Table 6: Style=upint (+ss08)

Command	<code>\int</code>	<code>\iint</code>	<code>\iiint</code>	<code>\iiiiint</code>	<code>\oint</code>	<code>\oiint</code>	<code>\oiiint</code>
Default	\int	\iint	\iiint	\iiiiint	\oint	\oiint	\oiiint
Upright	\int	\iint	\iiint	\iiiiint	\oint	\oiint	\oiiint

Command	<code>\intclockwise</code>	<code>\awint</code>	<code>\varointclockwise</code>	<code>\ointctrckwise</code>
Default	\int	\int	\oint	\oint
Upright	\int	\int	\oint	\oint

3.5 Standard LaTeX maths commands

All standard LaTeX maths commands, all amssymb commands and all latexsym commands are supported by Lato Math, for some of them loading `lato-math.sty` is required.

Various wide accents and extensible arrows are also supported:

☞ `\wideoverbar` and `\mathunderbar`⁹

$$\bar{x} \quad \overline{xy} \quad \overline{xyz} \quad \overline{A \cup B} \quad \overline{A \cup (B \cap C) \cup D} \quad \underline{m+n+p}$$

☞ `\widehat` and `\widetilde`

$$\hat{x} \quad \widehat{xx} \quad \widehat{xxx} \quad \widehat{xxxx} \quad \widehat{xxxxx} \quad \widehat{xxxxxxx} \quad \tilde{x} \quad \widetilde{xx} \quad \widetilde{xxx} \quad \widetilde{xxxx} \quad \widetilde{xxxxx} \quad \widetilde{xxxxxx}$$

☞ `\widecheck` and `\widebreve`

$$\check{x} \quad \widecheck{xxx} \quad \widecheck{xxxxxx} \quad \breve{x} \quad \breve{xxx} \quad \breve{xxxxxx}$$

☞ `\overparen` and `\underparen`

$$\overparen{x} \quad \overparen{xy} \quad \overparen{xyz} \quad \overparen{A \cup B} \quad \overparen{A \cup (B \cap C) \cup D} \quad \overbrace{x+y}^2 \quad \overbrace{a+b+\dots+z}^{26}$$

⁹`\overline` and `\underline` are not font related, they are based on `\rule`.

$$\overbrace{x} \quad \overbrace{xz} \quad \overbrace{xyz} \quad \overbrace{x+z}^2 \quad \overbrace{a+b+\dots+z}^{26}$$

☞ \overbrace and \underbrace

$$\overbrace{a} \quad \overbrace{ab} \quad \overbrace{abc} \quad \overbrace{abcd} \quad \overbrace{abcde} \quad \overbrace{a+b+c}^3 \quad \overbrace{a+b+\dots+z}^{26}$$

$$\underbrace{a} \quad \underbrace{ab} \quad \underbrace{abc} \quad \underbrace{abcd} \quad \underbrace{abcde} \quad \underbrace{a+b+c}_3 \quad \underbrace{a+b+\dots+z}_{26}$$

☞ \overbracket and \underbracket

$$\overbracket{a} \quad \overbracket{ab} \quad \overbracket{abc} \quad \overbracket{abcd} \quad \overbracket{abcde} \quad \overbracket{a+b+c}^3 \quad \overbracket{a+b+\dots+z}^{26}$$

$$\underbracket{a} \quad \underbracket{ab} \quad \underbracket{abc} \quad \underbracket{abcd} \quad \underbracket{abcde} \quad \underbracket{a+b+c}_3 \quad \underbracket{a+b+\dots+z}_{26}$$

☞ \overrightarrow and \overleftarrow

$$\overrightarrow{v} \quad \overrightarrow{M} \quad \overrightarrow{vv} \quad \overrightarrow{AB} \quad \overrightarrow{ABC} \quad \overrightarrow{ABCD} \quad \overrightarrow{ABCDEFGH}.$$

$$\overleftarrow{v} \quad \overleftarrow{M} \quad \overleftarrow{vv} \quad \overleftarrow{AB} \quad \overleftarrow{ABC} \quad \overleftarrow{ABCD} \quad \overleftarrow{ABCDEFGH}$$

☞ \overrightarrow and \overleftarrow

$$\overrightarrow{v} \quad \overrightarrow{M} \quad \overrightarrow{vv} \quad \overrightarrow{AB} \quad \overrightarrow{ABC} \quad \overrightarrow{ABCD} \quad \overrightarrow{ABCDEFGH}.$$

$$\overleftarrow{v} \quad \overleftarrow{M} \quad \overleftarrow{vv} \quad \overleftarrow{AB} \quad \overleftarrow{ABC} \quad \overleftarrow{ABCD} \quad \overleftarrow{ABCDEFGH}$$

☞ \underrightarrow and \underleftarrow

$$\underrightarrow{v} \quad \underrightarrow{M} \quad \underrightarrow{vv} \quad \underrightarrow{AB} \quad \underrightarrow{ABC} \quad \underrightarrow{ABCD} \quad \underrightarrow{ABCDEFGH}.$$

$$\underleftarrow{v} \quad \underleftarrow{M} \quad \underleftarrow{vv} \quad \underleftarrow{AB} \quad \underleftarrow{ABC} \quad \underleftarrow{ABCD} \quad \underleftarrow{ABCDEFGH}$$

☞ \underrightharpoonup and \underleftharpoonup

$$\underrightharpoonup{v} \quad \underrightharpoonup{M} \quad \underrightharpoonup{vv} \quad \underrightharpoonup{AB} \quad \underrightharpoonup{ABC} \quad \underrightharpoonup{ABCD} \quad \underrightharpoonup{ABCDEFGH}.$$

$$\underleftharpoonup{v} \quad \underleftharpoonup{M} \quad \underleftharpoonup{vv} \quad \underleftharpoonup{AB} \quad \underleftharpoonup{ABC} \quad \underleftharpoonup{ABCD} \quad \underleftharpoonup{ABCDEFGH}.$$

All the extensible arrows provided by the `mathtools` package are available in the Lato Math font (loading `lato-math.sty` is required), f.i.:

$$X \overset{\text{above}}{\rightleftharpoons} Y \overset{\text{under}}{\hookrightarrow} Z \overset{\text{above}}{\hookrightarrow} W$$

A wide range of extensible vertical delimiters is provided:

$$\diagup \left(\begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right) \left[\begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right] \left\{ \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right\} \left| \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right| \parallel \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \parallel \parallel \left[\begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right] \left| \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right| \parallel \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \parallel \left\langle \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right\rangle \left\langle \begin{matrix} a_1 \\ a_2 \\ a_3 \end{matrix} \right\rangle \diagdown$$

3.6 Mathematical alphabets

- ☞ All Latin and Greek characters are available in italic, upright, bold and bold italic via the `\symit{}`, `\symup{}`, `\symbf{}` and `\symbfit{}` commands.

- 👉 Calligraphic alphabet (`\symscr` or `\symcal` or `\mathcal` command), uppercase:

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

also in boldface (`\symbfscr`, `\symbfcal` or `\mathbfcal` command):

ABCDEFGHIJKLMNOPQRSTUVWXYZ

- 👉 Blackboard-bold alphabet (`\symbb` or `\mathbb` command):

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz 0123456789

- 👉 Fraktur alphabet is borrowed from Latin Modern, medium and bold (`\symfrac`, or `\symbffrac` commands):

အဗေဒနာတို့ကလေးများသည် အဘယ်သူ့ကိုး
အဗေဒနာတို့ကလေးများသည်

abcdefghijklmnopqrstuvwxyz
abcdefghijklmnopqrstuvwxyz

but this can be overwritten, i.e.

```
\setmathfont{Asana-Math.otf}[range=frak,Scale=MatchUppercase]
$\symfrak{ABCDEFGHJKLMN...XYZ abcdefghijklm...xyz}$
```

☞ Typewriter alphabet is sans-serif: 0123456789

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

but it can be borrowed from another maths font.

Like Latin Modern, LatoMath provides only four lowercase latin letters in script (or calligraphic) shape: e , g , ℓ , σ (`\mscre`, `\mscrg`, `\elll`, `\mscro`).

All others (range "1D4B6 to "1D4CF) have to be borrowed from another maths font if needed, i.e.

```
\setmathfont{LibertinusMath-Regular.otf}%  
[range="1D4B6-"1D4CF, Scale=MatchLowercase]
```

3.7 Bold variant

In case short maths formulas have to be printed in section titles, a *limited* bold variant is provided. Example of usage: **Einstein's equation $E = mc^2$**

```
\setmathfont{LatoMath-Bold.otf}[version=bold, options]  
\section{\mathversion{bold} Einstein's equation  $E=mc^2$ }
```

It is also possible to use the `\boldmath` command¹⁰:

```
\setmathfont{LatoMath-Regular.otf}[BoldFont=LatoMath-Bold.otf]  
\section{\boldmath Einstein's equation  $E=mc^2$ }
```

3.8 Missing symbols

Lato Math is fairly complete (see file `unimath-sans.pdf`), if you happen to need some of the few missing glyphs you can borrow them from a more complete font, say New Computer Modern. For instance if you need Italic Blackboard Bold (U+2145 to U+2149) you could try:

```
\setmathfont{NewCMMath-Book.otf}[range={"2145-"2149}, Scale=1.05]
```

Let's mention albatross, a useful tool to find out the list of fonts providing a given glyph: f.i. type in a terminal "albatross U+2145", see the manpage or `albatross-manual.pdf`.

¹⁰The `\boldmath` command works out of the box when `lato-math.sty` is loaded.

4 Acknowledgements

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