

# ◌ Erewhon-Math ◌

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## 1 What is Erewhon-Math?

Erewhon-Math is an Utopia based Opentype mathematical font. The mathematical symbols and Greek letters are borrowed or derived from Michel Bovani's Fourier-GUTenberg, Latin letters and digits are borrowed from Michael Shape's Erewhon font.

It requires LuaTeX or XeTeX as engine and the unicode-math package<sup>1</sup>.

It is meant to be used with Utopia based Opentype text fonts like Erewhon. For Fourier-GUTenberg users who want to switch to LuaLaTeX or XeLaTeX, the file `fourier-otf.sty` can be used as a replacement of `fourier.sty`.

Please note that the current version (0.40) is *experimental, do expect metrics and glyphs to change* until version 1.0 is reached.

Comments, suggestions and bug reports are welcome!

## 2 Usage

### 2.1 Calling `\setmathfont`

A basic call for Erewhon-Math would be:

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

this loads Erewhon-Math as math font with the default options, see subsections 3.1 on the following page, 3.2 on page 3 and 3.3 on page 4 for customisation.

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

```
\setmainfont{Erewhon}                % rm  
\setsansfont{Cabin}[Scale=MatchLowercase] % sf  
\setmonofont{Inconsolatazi4}[Scale=MatchLowercase] % tt
```

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<sup>1</sup>Please read the documentation `unicode-math.pdf`.

otherwise you would get Latin Modern for text fonts.

## 2.2 Calling `fourier-otf.sty`

As an alternative to load Erewhon-Math –*this is the recommended way*– you can type:

```
\usepackage[ options2 ]{fourier-otf}
```

it also loads `unicode-math` with the default options and sets Fourier Math as Math font but does a bit more:

1. it checks at `\begin{document}` if packages `amssymb` or `latexsym` are loaded and issues warnings in case they are;
2. it provides aliases for glyphs named differently in Unicode, so that `latexsym` or AMS names are also available;
3. it loads `fourier-orns.sty`, providing many text ornaments;
4. it defines specific Math characters like `\Bbbbackslash` ( $\backslash$ ), `\vareemptyset` ( $\emptyset$ ), `\parallelslant` ( $//$ ), `\shortparallelslant` ( $\#$ ), etc.;
5. it reduces spacing in math mode: `\thinmuskip`, `\medmuskip` and `\thickmuskip` are reduced as in `fourier.sty`. The option `loose` disables these settings.

## 3 What is provided?

Erewhon-Math provides all glyphs supplied by Fourier-GUTenberg plus all glyphs available in the `amssymb` and `latexsym` packages and many more. Therefore, these two packages *should not* be loaded as they might override Erewhon-Math glyphs.

Sans-serif, typewriter and fraktur styles are borrowed from Latin Modern fonts. See in section 3.5 on page 7 how to choose from other Math fonts for these styles.

A full list of available glyphs is shown in file `unimath-erewhon.pdf`.

### 3.1 Upright or slanted?

Package `unicode-math` follows  $\text{\TeX}$  conventions for Latin and Greek letters: in math 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  $\text{A}\Gamma\dots\Omega$  are printed upright. This can be changed by option `math-style` as shown in table 1 on the following page.

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 on the next page.

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<sup>2</sup>Possible *options* are `loose` or any of the options described below for `\setmainfont`.

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

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

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

Package option	Latin	Greek
bold-style=ISO	$(\boldsymbol{a}, \boldsymbol{z}, \boldsymbol{B}, \boldsymbol{X})$	$(\boldsymbol{\alpha}, \boldsymbol{\beta}, \boldsymbol{\Gamma}, \boldsymbol{\Xi})$
bold-style=TeX	$(\boldsymbol{a}, \boldsymbol{z}, \boldsymbol{B}, \boldsymbol{X})$	$(\boldsymbol{\alpha}, \boldsymbol{\beta}, \boldsymbol{\Gamma}, \boldsymbol{\Xi})$
bold-style=upright	$(\boldsymbol{a}, \boldsymbol{z}, \boldsymbol{B}, \boldsymbol{X})$	$(\boldsymbol{\alpha}, \boldsymbol{\beta}, \boldsymbol{\Gamma}, \boldsymbol{\Xi})$

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

All these options are offered by the `unicode-math` package but they can be added to the `\setmathfont` call<sup>3</sup>, for example:

`\setmathfont{Erewhon Math}[math-style=french,partial=upright]`  
will print for the code

`\[ \frac{\partial f}{\partial x} = \alpha \mathbf{\nabla} + a \mathbf{\nabla} \Gamma + \beta \mathbf{M} \]`  
`+ \mathbf{\beta} \mathbf{M} \]`

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

while the default settings would print

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

If your text editor is able to handle greek letters or math 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

Erewhon-Math provides eleven “Character Variants” options to choose between different glyphs for Greek characters and some others, see table 3 on the following page for the full list.

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

`\setmathfont{Erewhon Math}[CharacterVariant={3,6}]`

<sup>3</sup>IMHO it is easier to add *all options* to the `\setmathfont` command.

This works for all shapes and weights of these characters:  $\backslash\mathrm{symit}\{\backslash\epsilon\}$ ,  $\backslash\mathrm{symup}\{\backslash\epsilon\}$ ,  $\backslash\mathrm{symbf}\{\backslash\epsilon\}$ ,  $\backslash\mathrm{symbf}\mathrm{it}\{\backslash\epsilon\}$  are output as  $\epsilon$ ,  $\epsilon$ ,  $\epsilon$ ,  $\epsilon$  instead of  $\epsilon$ ,  $\epsilon$ ,  $\epsilon$ ,  $\epsilon$ .

The same is true for  $\backslash\phi$  of course. Please note that curly braces are mandatory whenever more than one “Character Variant” is selected.

Table 3: Character variants.

	Default	Variant	Name
cv00	0	0	0
cv01	$\hbar$	$\hbar$	$\backslash\mathrm{hslash}$
cv02	$\emptyset$	$\emptyset$	$\backslash\mathrm{emptyset}$
cv03	$\epsilon$	$\epsilon$	$\backslash\mathrm{epsilon}$
cv04	$\kappa$	$\kappa$	$\backslash\mathrm{kappa}$
cv05	$\pi$	$\pi$	$\backslash\mathrm{pi}$
cv06	$\phi$	$\phi$	$\backslash\mathrm{phi}$
cv07	$\rho$	$\rho$	$\backslash\mathrm{rho}$
cv08	$\sigma$	$\sigma$	$\backslash\mathrm{sigma}$
cv09	$\theta$	$\theta$	$\backslash\mathrm{theta}$
cv10	$\Theta$	$\Theta$	$\backslash\mathrm{Theta}$

### 3.3 Stylistic sets

Erewhon-Math provides four “Stylistic Sets” options to choose between different glyphs for families of mathematical symbols.

$\mathrm{StylisticSet}=4$ , alias<sup>4</sup>  $\mathrm{Style}=\mathrm{leqslant}$ , converts (large) inequalities into their slanted variants as shown by table 4 on the next page.

$\mathrm{StylisticSet}=5$ , alias  $\mathrm{Style}=\mathrm{smaller}$ , converts some symbols into their smaller variants as shown by table 5 on the following page.

$\mathrm{StylisticSet}=6$ , alias  $\mathrm{Style}=\mathrm{subsetneq}$ , converts some inclusion symbols as shown by table 6 on the next page.

$\mathrm{StylisticSet}=7$ , alias  $\mathrm{Style}=\mathrm{parallelslant}$ , converts “parallel” symbols into their slanted variants as shown by table 7 on the following page.

To enable Stylistic Sets 4, 6 and 7 for Erewhon-Math, you should enter

```
\setmathfont{Erewhon Math}[StylisticSet={4,6,7}] or
\usepackage[Style={leqslant,subsetneq,parallelslant}]{fourier-otf}
```

then,  $\backslash[x\leq y \quad A \subsetneq B \quad D \parallel D' \quad]$  will print as

$$x \leqslant y \quad A \subsetneq B \quad D \parallel D'$$

instead of

$$x \leq y \quad A \subsetneq B \quad D \parallel D'$$

<sup>4</sup>These Style aliases are provided by `fourier-otf.sty`.

Table 4: Stylistic Set 4 – leqslant (slanted inequalities)

Command	Default	Variant
<code>\leq</code>	$\leq$	$\leqslant$
<code>\geq</code>	$\geq$	$\geqslant$
<code>\nleq</code>	$\nleq$	$\nleqslant$
<code>\ngeq</code>	$\ngeq$	$\ngeqslant$
<code>\leqq</code>	$\leqq$	$\leqslant$
<code>\geqq</code>	$\geqq$	$\geqslant$
<code>\eqless</code>	$\eqless$	$\eqless$
<code>\eqgtr</code>	$\eqgtr$	$\eqgtr$
<code>\lesseqgtr</code>	$\lesseqgtr$	$\lesseqgtr$
<code>\gtreqless</code>	$\gtreqless$	$\gtreqless$
<code>\lesseqqgtr</code>	$\lesseqqgtr$	$\lesseqqgtr$
<code>\gtreqqless</code>	$\gtreqqless$	$\gtreqqless$

Table 5: Stylistic Set 5 – smaller (smaller variants)

Command	Default	Variant
<code>\in</code>	$\in$	$\in$
<code>\ni</code>	$\ni$	$\ni$
<code>\mid</code>	$\mid$	$\mid$
<code>\nmid</code>	$\nmid$	$\nmid$
<code>\parallel</code>	$\parallel$	$\parallel$
<code>\nparallel</code>	$\nparallel$	$\nparallel$
<code>\parallelslant</code>	$\parallel$	$\parallel$
<code>\nparallelslant</code>	$\nparallel$	$\nparallel$

Table 6: Stylistic Set 6 – subsetneq (inclusion variants)

Command	Default	Variant
<code>\subsetneq</code>	$\subsetneq$	$\subsetneq$
<code>\supsetneq</code>	$\supsetneq$	$\supsetneq$
<code>\subsetneqq</code>	$\subsetneqq$	$\subsetneqq$
<code>\supsetneqq</code>	$\supsetneqq$	$\supsetneqq$

Table 7: Stylistic Set 7 – parallelslant (slanted variants)

Command	Default	Variant
<code>\parallel</code>	$\parallel$	$\parallel$
<code>\nparallel</code>	$\nparallel$	$\nparallel$
<code>\shortparallel</code>	$\parallel$	$\parallel$
<code>\nshortparallel</code>	$\nparallel$	$\nparallel$

### 3.4 Standard $\text{\LaTeX}$ math commands

All standard  $\text{\LaTeX}$  math commands, all `amssymb` commands and all `latexsym` commands are supported by Erewhon-Math, for some of them loading `fourier-otf.sty` is required.

Various wide accents are also supported:

☞ `\widehat` and `\widetilde`

$$\widehat{x} \widehat{xx} \widehat{xxx} \widehat{xxxx} \widehat{xxxxx} \widehat{xxxxxx} \widetilde{x} \widetilde{xx} \widetilde{xxx} \widetilde{xxxx} \widetilde{xxxxx} \widetilde{xxxxxx}$$

☞ `\overline` and `\underline`

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

☞ `\overparen` and `\underparen`

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

$$\underbrace{x} \underbrace{xz} \underbrace{xyz} \underbrace{x+z}_2 \underbrace{a+b+\dots+z}_{26}$$

☞ `\overbrace` and `\underbrace`

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

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

☞ `\overbracket` and `\underbracket`

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

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

☞ `\overrightarrow` and `\overleftarrow`

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

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

☞ Finally `\widearc` and `\overrightarrowarc` (loading `fourier-otf.sty` is required)

$$\widearc{AMB} \overrightarrowarc{AMB}$$

### 3.5 Mathematical alphabets

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

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

*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*

- 👉 Blackboard-bold alphabet (`\symbb` or `\mathbb` command), uppercase, lowercase and digits:

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz 0123456789

- ☞ Fraktur alphabet is borrowed from Latin Modern,

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

but this can be overwritten, i.e.

$$\frac{ABCDEFGHIJKL \dots XYZ}{abcdefghijklkl \dots xyz}$$

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

- ☞ Sans serif alphabet is borrowed from Latin Modern,

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

but it can be borrowed from another Math font, i.e.

```
\setmathfont{STIX2Math.otf}[range={sfup,sfit},
                               Scale=MatchUppercase]
$\symsfup{ABCD...klm}\quad\symsfit{NOPQ...xyz}$
```

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

- ☞ Typewriter alphabet is borrowed from Latin Modern,

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

but it can be borrowed from another Math font, i.e.

```
\setmathfont{STIX2Math.otf}[range=tt,Scale=MatchUppercase]
$\symtt{ABCDE...XYZ abcde...xyz}$
```

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

### 3.6 Fourier ornaments

All logos and ornaments provided by Fourier-GUTenberg (fourier-orns.sty) are available with Erewhon-Math when loaded by `\usepackage{fourier-otf}`.

fourier-orns.sty as of v2.0 automatically fetches its glyphs in a specific OpenType font with LuaTeX or XeTeX engines and from a Type 1 font otherwise (pdfTeX).

☞ `\textpertenthousand` ‰, ‰, ‰, ‰,

☞ A variant of the euro symbol: `\eurologo` €, €, €, €,

☞ A “starred” bullet: `\starredbullet` †,

☞ Decos and logos: `\warning` ⚠, `\noway` ☹, `\textxswup` ⚡, `\textxswdown` ⚡, `\bomb` 💣, `\decoone` ✂, `\decotwo` ☞, `\decothreeleft` ⚡, `\decothreeright` ⚡, `\decofourleft` ⚡, `\decofourright` ⚡, `\decosix` ✨, `\floweroneleft` 🌸, `\floweroneright` 🌸, `\lefthand` ☞, `\righthand` ☞.

☞ Smileys: `\grimace` 😬, `\texttthing` 🙄.

☞ Leaves: `\aldineleft` 🌿, `\aldineright` 🌿, `\aldine` 🌿, `\aldinesmall` 🌿, `\leafleft` 🌿, `\leafright` 🌿, `\leafNE` 🌿, `\leafNW` 🌿, `\leafSE` 🌿, `\leafSW` 🌿.

☞ Pilcrows: `\oldpilcrowone` ¶, `\oldpilcrowtwo` ¶, `\oldpilcrowthree` ¶, `\oldpilcrowfour` ¶, `\oldpilcrowfive` ¶aaaa, `\oldpilcrowsix` ¶aaaaaaaaa.

Finally, some symbols are also provided in math mode, with other names:

☞ `\$forbidden$` (☹), `\$beware$` (⚠), `\$boom$` (💣),

☞ `\$thething$` (🙄) is a *QED symbol* for a false proof. Of course, you don’t need it!

☞ `\$xswordsup$` (⚡) and `\$xswordsdown$` (⚡) may be used as tags for a debated statement, or for anything else. ✂

## 4 Acknowledgements

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