The unimath-plain-X∃TEX package

Zhang Tingxuan

2023/03/06   Version 0.2b

Abstract

unimath-plain-X∃TEX package provides OpenType math font support in *plain TEX* format. The unimath-plain-X∃TEX package needs X∃TEX.

Contents

1   How to use this package?

Please notice again that you're using *plain* format but not LATEX format. If you are using LATEX format, please use unicode-math package instead.

In your document, write

```
\input unimath-plain-xetex
```

Then compile your document with xetex, you can get OpenType math support in your document. The package will set the math font "Latin Modern Math" with "Latin Modern" text fonts in default. To change the font, you can define some names before loading the package. For example,

```
\def\mainfontname{TeX Gyre Termes}
\def\sansfontname{TeX Gyre Heros}
\def\monofontname{TeX Gyre Cursors}
\def\mathfontname{TeX Gyre Termes Math}
\input unimath-plain-xetex
```

Your text fonts will be set in the first 3 lines and your math font will be set in the fourth line.

Currently, the package supports only font family names to use, if you want to use the file names, you can revise the code in `unimath-plain-xetex.tex`.

2   Text font commands

The package provides text font commands in the format of

$$\backslash\langle\textit{pt-size}\rangle\langle\textit{family}\rangle\langle\textit{series}\rangle\langle\textit{shape}\rangle$$

such as `\tensfbfit`, `\twelvebf`, etc. The packages provides font commands in size of 5 pt, 7 pt, 9 pt, 10 pt, 12 pt and 20 pt, such as `\fiverm`, `\sevensf`, `\twelvett`, etc.

Take ten point as an example,

(Serif)	Upright	*Italic*	(Sans)	Upright	*Italic*	(Mono)	Upright	Italic
Medium	\tenrm	\tenit	Medium	\tensf	\tensfit	Medium	\tentt	\tenttit
Bold	\tenbf	\tenbfit	**Bold**	\tensfbf	\tensfbfit	**Bold**	\tenttbf	\tenttbfit

The font commands can be used as those provided in `plain.tex`, for example, {\tenbfit ABC} yields ***ABC***.

But if you would't like to remember that many commands, you can write

$$\backslash\texttt{makefontcmdcompatible}\{\langle\textit{pt-size}\rangle\}$$

after loading the package. For example, if you write

```
\makefontcmdcompatible{ten}
```

the ⟨*family*⟩-⟨*series*⟩-⟨*shape*⟩ order of `\ten`⟨*some*⟩ commands can be write randomly: writing `\tenbfsfit` is the same as `\tensfbfit`.

You can also get more text font commands through the `\genfontcmd` command:

$$\backslash\texttt{genfontcmd}\{\langle\textit{pt-size}\rangle\}\{\langle\textit{dimension}\rangle\}$$

For example,

```
\genfontcmd{fortyfour}{44pt}
\genfontcmd{verytiny}{2bp}
```

will make commands like `\fortyfourrm` and `\verytinysfbfit` available.

3

3 Math font commands

You can input math formulae just like using traditional plain TEX. But Open-Type math font is loaded. For example, `$a{\mbf0}={\mbf0}$` yields $a\mathbf{0} = \mathbf{0}$. Available math font commands are listed below:

```
\mrm, \mbf, \mit, \msf, \mtt,
\mbfit, \msfbf, \msfit, \msfbfit,
\cal, \calbf, \bb, \bbit, \frak, \frakbf
```

The ⟨*family*⟩-⟨*series*⟩-⟨*shape*⟩ order of these commands allows being random; cal can be replaced by scr.

Please notice, that the commands in the first and second line of the chart above contain an extra "m" in the beginning of commands. For example, the first "m" in the "\mrm" command in the first line. If you didn't write the "m" in these commands, the font selected by the commands would be no more math font, but text font.

The "math font" we said here means the font selected by \mathfontname, \mathalphafontname and so on; the "text font" means the font selected by \mainfontname, \sansfontname and \monofontname. For example,

Input	*yields*
`$\mit  abcdefg \mbfit  hijklmn$`	$abcdefg\,\boldsymbol{hijklmn}$
`$\it   abcdefg \bfit   hijklmn$`	$abcdefg\boldsymbol{hijklmn}$
`$\msfit abcdefg \msfbfit hijklmn$`	$abcdefg\,\mathsf{hijklmn}$
`$\sfit  abcdefg \sfbfit  hijklmn$`	$abcdefg\mathsf{hijklmn}$

A group of symbols in math font can be regarded as separate symbols, and a group of symbols in text font can be regarded as a whole.

This package uses unicode-math-symbols.tex to generate math symbol commands, the source file can be found in unicode-math (LATEX) package. To find all of the math symbol commands, you can execute

```
texdoc unimath-symbols
```

in Terminal.

You can also input Unicode math characters in your document's source file. For example,

Input	*yields*
`$ ∑_{i=0}^∞ ∫_a^b ρ_i \, {\rm d} τ' $`	$\sum_{i=0}^{\infty} \int_a^b \rho_i \, \mathrm{d}\tau'$
`$$∑_{i=0}^∞ ∫_a^b ρ_i \, {\rm d} τ'$$`	$\displaystyle\sum_{i=0}^{\infty} \int_a^b \rho_i \, \mathrm{d}\tau'$

4 Primes (′)

The package changed "'" command in math mode, which yields prime(s) in superscript. After loading this package, the primes produced by "'" will be turned into Unicode primes:

Input	*yields*	*Unicode slot*
`$'$`	′	U+2032
`$''$`	″	U+2033
`$'''$`	‴	U+2034
`$''''$`	⁗	U+2057
`$'''''$`	′′′′′	(U+2032) × 5
⋮	⋮	⋮
(') × N	(′) × N	(U+2032) × N ($N > 4$)

However, some OpenType math fonts don't contain some of the characters above. For example, there is no U+2032, U+2033 or U+2034 in Erewhon Math. When using such fonts, you can "turn off" the Unicode primes easily by inputing the following line *after* loading the package:

```
\unicodeprimesoff
```

Then when you input "'" n times you will get n primes, and each prime's Unicode character slot is U+2032, even when $n \leq 4$.

If the primes contain more than one single prime encoded U+2032, a negative math skip will inserted between every two single primes. This math skip is defined as `\betweenprimeskip` and its default value is `-2.7mu`, which is proper

for Latin Modern Math. To change the value of \betweenprimeskip is just like change any math skip, for example,

```
\betweenprimeskip=-1mu
```

This line should also be written *after* loading the package.

5 Using multiple math fonts

You can use more than one OpenType math fonts in math mode. This is the method to set multiple math fonts:

```
\def\mathalphafontname{⟨font family name⟩}
\def\mathdelimiterfontname{⟨font family name⟩}
\def\mathordfontname{⟨font family name⟩}
\def\mathopfontname{⟨font family name⟩}
\def\mathbinfontname{⟨font family name⟩}
\def\mathaccentfontname{⟨font family name⟩}
```

Such definitions should be written *before* \inputing the package. For example,

```
\def\mathfontname{XITS Math}
\def\mathalphafontname{TeX Gyre Pagella Math}
\input unimath-plain-xetex
```

Then your math font will be set as XITS Math and the font of variable family (numbers, Latin and Greek letters) will be set as TEX Gyre Pagella Math.

\mathalphafontname will influence the font of numbers (0–9), Latin letters (A–Z, a–z) and Greek letters (\alpha and so on).

\mathdelimiterfontname will influence the font of math delimiters, for example, extensible open symbols, close symbols and ordinary symbols like \{, \}, \vert and so on. Horizontal delimiters (or very long accents) are also influenced by \mathdelimiterfontname.

\mathordfontname will influence the font of non-delimiter ordinary symbols, punctuations and "!". For example, ",", ":" and \colon's font will be influenced by it.

\mathopfontname will influence the font of large operators like \sum.

\mathbinfontname will influence the font of binary operators and relations like "+" and "=".

\mathaccentfontname will influence the font of math accents like \dot.