newtxsf—A Sans Serif Math Package

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1   Introduction

I was spurred to make this package by one of the excellent features of the STIX fonts—mathematical Roman and Greek sans serif alphabets with all glyphs unmistakable, unlike most sans serif fonts. These are sized to match Times, with xheights near 440em, rather smaller than most sans serif fonts. So, this package was constructed by replacing the existing math italic in newtxmath with the sans serif glyphs from STIX and simplifying the options. The result is a math package that blends well with sans serif text fonts with an xheight similar to that of Times. Surprisingly, it does seem to work well with some other sans serif fonts with larger xheights, such as *FiraSans* at about 530em. With modern-day projectors having considerably higher resolutions than a few years ago, large xheight may be less of a concern than it once was. (Note: *FiraSans* also works well with the *Arev Sans* package, where the xheight is larger.)

2   Package Options

The options are much simpler than in newtxmath, as I have ruled out a number which, in my opinion, were of interest only for backward compatibility. These are the options you may specify.

- scaled allows you to scale all fonts in this math package to match a chosen text font family.

- nosymbolsc saves you a math group of mostly rather obscure symbols.

- cmintegrals makes use of integrals drawn from Computer Modern rather than the more upright, but unattractive, txfonts integrals. (This option no longer has any effect since newtx now uses a similar collection of integral signs.)

- upint produces upright integral signs. (The default shape is slanted.)

- noamssymbols saves you one or two math groups (the AMS symbols) if you have no need of them. If you use an AMS document class, like amsart, be sure to specify noamsfonts among its options, if using a recent version of the AMS class.

- amssymbols does the opposite—this is the default.

- uprightGreek specifies the use of upright rather than slanted Greek symbols for uppercase only.

- slantedGreek does the opposite.

- frenchmath forces uppercase and lowercase Greek to upright shape and makes uppercase math Roman letters render in upright rather than slanted shape.

- noSTIXops (added in version 1.055) prevents the package from defaulting to STIX sans serif for math figures, leading instead to use of the figures in the Roman text font.

3 Package features

There is little difference between the symbols available using this package and those available in `newtxmath`, taking into account the reduced set of options, and the latter are adequately described in the documentation for `newtx`. The differences are as follows.

- Unlike `newtxmath`, `newtxsf` defines its own figures and makes no use of (lining) figures from the text package, but does use the text font for names of operators such as `\sin`. For this reason, you need to match xheights of the text and math fonts at least approximately.

- The only blackboard bold fonts built into `newtxsf` is an expanded version of those from the STIX package. For example, in math mode, `\mathbb{012ABC}` produces $\mathbb{012ABC}$, and this works also in bold math.

- All math accents are taken from `newtxsf` rather than the text package.

- The option `bigdelims` from `newtxmath` is no longer needed—it is applied automatically in `newtxsf`.

- `\forall`, `\exists`, `\nexists` and `\emptyset` have been `\let` to alternate versions which look better, in my opinion: $\forall$, $\exists$, $\nexists$, $\varnothing$.

- The math fonts now have upright versions of `\imath` and `\jmath` (i.e., `\dotlessi` and `\dotlessj`) named `\upimath` and `\upjmath`. Bold versions are available as well. For example, $x\vec{\imath} + y\vec{\mathbf{j}}$, $2\hat{\imath} + 3\hat{\jmath}$.

4 Package examples

4.1

In this documentation, the text font is *FiraSans* scaled down to more closely match *newtxsf*. (As *FiraSans* has an xheight about 17% greater than *newtxsf*, some scaling is important.) It uses the following preamble.

```
\usepackage[sfdefault,scaled=.85]{FiraSans}
\usepackage[T1]{fontenc}
\usepackage{textcomp}
\usepackage[varqu,varl]{zi4}% inconsolata typewriter
\usepackage{amsmath,amsthm}
\usepackage{newtxsf}
```

Here's a piece math to illustrate mathematical text—note the use of upright forms of π and d, following the ISO rules.

Simplest form of the *Central Limit Theorem*: *Let X_1, X_2, $\cdots$ be a sequence of iid random variables with mean 0 and variance 1 on a probability space $(\Omega, \mathcal{F}, \mathbb{P})$. Then*

$$\mathbb{P}\left(\frac{X_1 + \cdots + X_n}{\sqrt{n}} \le y\right) \to \mathfrak{N}(y) := \int_{-\infty}^{y} \frac{\mathrm{e}^{-t^2/2}}{\sqrt{2\pi}}\, \mathrm{d}t \quad \text{as } n \to \infty,$$

or, equivalently, letting $S_n := \sum_1^n X_k$,

$$\mathbb{E}f\left(S_n/\sqrt{n}\right) \to \int_{-\infty}^{\infty} f(t)\frac{\mathrm{e}^{-t^2/2}}{\sqrt{2\pi}}\, \mathrm{d}t \quad \text{as } n \to \infty, \text{ for every } f \in \mathrm{b}C(\mathbb{R}).$$

4.2

For use with fontspec, it is important to load fontspec with option `no-math` so that fontspec does not override some of the non-unicode settings in `newtxsf`.

```
\usepackage[no-math]{fontspec}
\setmainfont{Helvetica Neue Light}
[BoldFont={Helvetica Neue Bold}, ItalicFont={* Italic}]
\setmonofont{Inconsolatazi4-Regular.otf}[Scale=MatchLowercase]
\usepackage{amsmath,amsthm}
\usepackage[noSTIXops,scaled=1.06]{newtxsf}
```