THE SANSMATHFONTS PACKAGE

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The Computer Modern font family has a sans serif typeface. However, compared to the serif typeface, it is incomplete: there are no sans serif small caps or math fonts. Furthermore, the bold slanted font is not available as an outline font. This leads to highly unsatisfactory typography of documents that use sans serif for the body text.

The sansmathfonts package provides these "missing" fonts. Most of the usefulness of the package is in the fonts; `sansmathfonts.sty` is a small package providing LaTeX support. To use it, simply say `\usepackage{sansmathfonts}` in the document preamble.

In the default (OT1) text font encoding, and also in the T1 and U font encodings, this will redefine the document's default sans serif font family from cmss to xcmss; this will make the ***bold slanted*** and CAPS AND SMALL CAPS fonts available via normal LaTeX font commands (`\textbf`, `\textit` and `\textsc`). If you additionally load Harald Harder's slantsc package, this will make *SLANTED CAPS AND SMALL CAPS* available.

This will also switch the math fonts to sans serif:

$$\Im \exp(i\omega) = \sin(\omega)$$

If you use symbols from the amsfonts or esint packages, they will also be replaced by appropriate sans serif versions:

$$\oint \quad \mho \quad \hbar$$

By default, the commands `\mathrm` and `\mathsf` both produce sans serif text. To get serifed roman text, use the command `\mathserif`:

$$\mathrm{mathrm} \quad \mathsf{mathsf} \quad \mathserif{mathserif}$$

sansmathfonts knows about the beamer document class and will automatically use beamer's `professionalfonts` theme.

The math fonts differ slightly from Knuth's standard sans serif fonts. Specifically, for ease of reading I have chosen to put (some of) the serifs back on the uppercase I, Pi and Xi:

$$\mathit{I} \quad \mathsf{I} \quad \mathbf{I} \quad \boldsymbol{I} \quad \mathit{\Pi} \quad \mathsf{\Pi} \quad \mathbf{\Pi} \quad \boldsymbol{\Pi} \quad \mathit{\Xi} \quad \mathsf{\Xi} \quad \mathbf{\Xi} \quad \boldsymbol{\Xi}$$ and not $$\mathsf{I} \quad \mathsf{\Pi} \quad \mathsf{\Xi}$$

Sans serif Is outside of math mode still have no serifs unless the package option `[I]` is used; note that this option as yet only works with the OT1 and U font encodings.

Feedback is appreciated and may be sent to `origamist@gmail.com`.

1. Package options

- `[I]` The `[I]` package option puts the serifs back on the capital I even in text mode. This option only works with the OT1 and U font encodings. It will work

under pdflatex's defaults; in LuaLaTeX or XeLaTeX, you will need to change the text encoding by saying `\usepackage[OT1]{fontenc}`.

- `[onlymath]`, `[nottext]`. These options provide sans serif math but do not change the text sans serif font.
- `[onlytext]`, `[notmath]`. These options provide sans serif text fonts and improve the behavior of `\mathsf` but do not change the default math font from roman to sans serif. You can get a similar effect by not using the sansmathfonts package and instead using the lines

  ```
  \renewcommand{\sfdefault}{xcmss}
  \DeclareFontFamilySubstitution{TS1}{xcmss}{cmss}
  ```

  or

  ```
  \renewcommand{\sfdefault}{cmsmf}
  \DeclareFontFamilySubstitution{TS1}{cmsmf}{cmss}
  ```

  in the document preamble.
- `[AMS]` This package option defines the following five commands:

`\sanshbar`	$\mathsf{\hbar}$
`\sanshslash`	$\mathsf{\hbar}$
`\sansmho`	$\mathsf{\mho}$
`\sanseth`	$\mathsf{\eth}$
`\sansbackepsilon`	$\mathsf{\backepsilon}$

  If the `[onlytext]` and `[notmath]` options are not selected, these commands are simply aliases for the corresponding AMS symbols `\hbar`, `\hslash`, `\mho`, `\eth`, `\backepsilon` (and will only work if the amssymb package is loaded).

  However, if the `[onlytext]` or `[notmath]` option is selected, then the above five commands will be redefined to produce sans serif symbols, even though `\hbar` and so on produce serifed symbols.
- `[letters]` This package option is similar to the `[AMS]` option. It defines sans serif versions of all the math symbols included in TeX's letters font:

`\sansalpha`	$\mathsf{\alpha}$	`\sansxi`	$\mathsf{\xi}$	`\sansvarrho`	$\mathsf{\varrho}$
`\sansbeta`	$\mathsf{\beta}$	`\sanspi`	$\mathsf{\pi}$	`\sansvarsigma`	$\mathsf{\varsigma}$
`\sansgamma`	$\mathsf{\gamma}$	`\sansrho`	$\mathsf{\rho}$	`\sansvarphi`	$\mathsf{\varphi}$
`\sansdelta`	$\mathsf{\delta}$	`\sanssigma`	$\mathsf{\sigma}$	`\sansstar`	$\mathsf{\star}$
`\sansepsilon`	$\mathsf{\epsilon}$	`\sanstau`	$\mathsf{\tau}$	`\sanspartial`	$\mathsf{\partial}$
`\sanszeta`	$\mathsf{\zeta}$	`\sansupsilon`	$\mathsf{\upsilon}$	`\sansflat`	$\mathsf{\flat}$
`\sanseta`	$\mathsf{\eta}$	`\sansphi`	$\mathsf{\phi}$	`\sansnatural`	$\mathsf{\natural}$
`\sanstheta`	$\mathsf{\theta}$	`\sanschi`	$\mathsf{\chi}$	`\sanssharp`	$\mathsf{\sharp}$
`\sansiota`	$\mathsf{\iota}$	`\sanspsi`	$\mathsf{\psi}$	`\sanssmile`	$\mathsf{\smile}$
`\sanskappa`	$\mathsf{\kappa}$	`\sansomega`	$\mathsf{\omega}$	`\sansfrown`	$\mathsf{\frown}$
`\sanslambda`	$\mathsf{\lambda}$	`\sansvarepsilon`	$\mathsf{\varepsilon}$	`\sansell`	$\mathsf{\ell}$
`\sansmu`	$\mathsf{\mu}$	`\sansvartheta`	$\mathsf{\vartheta}$	`\sanswp`	$\mathsf{\wp}$
`\sansnu`	$\mathsf{\nu}$	`\sansvarpi`	$\mathsf{\varpi}$		

  As with `[AMS]`, these are aliases to the corresponding standard commands if `[onlytext]` and `[notmath]` are not selected, and are a new math alphabet if `[onlytext]` or `[notmath]` is selected.

  Note that sans symbols for uppercase Greek letters are *not* provided, as `\mathsf{\Gamma}` produces $\mathsf{\Gamma}$ (not Γ) even if `[onlytext]` or `[notmath]` is selected.

2. List of new fonts

All of the Type 1 fonts in this package were generated using mftrace 1.2.18 and Fontforge.

The following fonts are based mainly on Donald Knuth's Computer Modern fonts.

Unslanted italic (needed in some versions of TEX for the pounds symbol £):

- cmssu10

Text CAPS AND SMALL CAPS, OT1 encoding:

- cmssbxcsc10
- cmssxicsc10
- cmsscsc8
- cmsscsci8
- cmsscsc9
- cmsscsci9
- cmsscsc10
- cmsscsci10

Math italic ($\alpha\beta\gamma abc\ell\wp$):

- cmssmi5
- cmssmi6
- cmssmi7
- cmssmi8
- cmssmi9
- cmssmi10
- cmssmib5
- cmssmib6
- cmssmib7
- cmssmib8
- cmssmib9
- cmssmib10

Math symbols ($\Re \oplus \Im$):

- cmsssy5
- cmsssy6
- cmsssy7
- cmsssy8
- cmsssy9
- cmsssy10
- cmssbsy5
- cmssbsy6
- cmssbsy7
- cmssbsy8
- cmssbsy9
- cmssbsy10

Math extended fonts ($\int \sum \prod$):

- cmssex7
- cmssex8
- cmssex9
- cmssex10

Sans serif text fonts with serifed capital I:

- cmsmf8
- cmsmf9
- cmsmf10
- cmsmf12
- cmsmf17
- cmsmfcsc8
- cmsmfcsc9
- cmsmfcsc10
- cmsmfbx8
- cmsmfbx9
- cmsmfbx10
- cmsmfbx12
- cmsmfbx17
- cmsmfbxcsc10
- cmsmfi8
- cmsmfi9
- cmsmfi10
- cmsmfi12
- cmsmfi17
- cmsmfcsci8
- cmsmfcsci9
- cmsmfcsci10
- cmsmfxi8
- cmsmfxi9
- cmsmfxi10
- cmsmfxi12
- cmsmfxi17
- cmsmfxicsc10

The following fonts are based on fonts by other authors.

Eddie Saudrais's esint package

- ssesint7
- ssesint8
- ssesint9
- ssesint10

AMS symbols (amsfonts package)

- ssmsam5
- ssmsam6
- ssmsam7
- ssmsam8
- ssmsam9
- ssmsam10

AMS symbols (amsfonts package)

- ssmsbm5
- ssmsbm6
- ssmsbm7
- ssmsbm8
- ssmsbm9
- ssmsbm10

The following fonts are based on Jörg Knappen's European Computer Modern fonts.

Normal	*Slanted*	**Bold**	***Bold slanted***
• eczz0500	• eczi0500	• eczx0500	• eczo0500
• eczz0600	• eczi0600	• eczx0600	• eczo0600
• eczz0700	• eczi0700	• eczx0700	• eczo0700
• eczz0800	• eczi0800	• eczx0800	• eczo0800
• eczz0900	• eczi0900	• eczx0900	• eczo0900
• eczz1000	• eczi1000	• eczx1000	• eczo1000
• eczz1095	• eczi1095	• eczx1095	• eczo1095
• eczz1200	• eczi1200	• eczx1200	• eczo1200
• eczz1440	• eczi1440	• eczx1440	• eczo1440
• eczz1728	• eczi1728	• eczx1728	• eczo1728
• eczz2074	• eczi2074	• eczx2074	• eczo2074
• eczz2488	• eczi2488	• eczx2488	• eczo2488
• eczz2986	• eczi2986	• eczx2986	• eczo2986
• eczz3583	• eczi3583	• eczx3583	• eczo3583

The following fonts are part of the sauter package and are supplied with MacTEX 2012 as Metafont (`.mf`) fonts. These provide **bold** and ***bold slanted*** fonts at varying sizes. The sansmathfonts package provides outline versions.

- cmssxi8
- cmssxi9
- cmssxi10
- cmssxi12
- cmssxi17
- cmssbx8
- cmssbx9
- cmssbx12
- cmssbx17

3. Files in this package

3.1. **New fonts.** 109 of the 146 new fonts listed in Section 2 come in three files each: the TEX Font Metric files (extension `.tfm`), the Type 1 font file (extension `.pfb`), and Metafont source file (extension `.mf`).

3.2. **Virtual fonts.** The 28 cmsmf fonts are almost identical to their cmss counterparts. Thus, these fonts are provided as *virtual* fonts, and so come in five parts: the virtual font file (`cmsmf10.vf`), the TEX Font Metric file (`cmsmf10.tfm`), and the font cmsmfIPiXi10 containing only the altered letters I, Ξ and Π (and ɪ, in the small caps fonts); this font comes as MetaFont source (`cmsmfIPiXi10.mf`), TEX font metric (`cmsmfIPiXi10.tfm`) and Type 1 font (`cmsmfIPiXi10.pfb`).

3.3. **Outline versions of preexisting fonts.** The Metafont source for the 9 cmssxi and cmssbx fonts are part of the sauter package. As such, I have not included any new `.mf` files for these fonts. I have provided outline versions (`.pfb` files) of these 9 fonts, as without the `.pfb` files these fonts are provided as bitmaps only, which looks very ugly on most modern displays.

I have also not included the files `cmssxi10.tfm`, etc., because they may be automatically generated from the corresponding `.mf` files and may already be included in some distributions.

However, in order to allow compilation on systems without the sauter package, I wanted to include `.tfm` files for these 9 fonts. For the reasons given above, I cannot title these fonts with the expected name of `cmssxi10.tfm`; instead I have

provided a file called `cmssxi10-cmsmfcopy.tfm` and included instructions (in the `.map` file) stating that both `cmssxi10-cmsmfcopy.tfm` and `cmssxi10.tfm` should use the outline font `cmssxi10.pfb`.

3.4. **Metafont source.** In addition, this package should come with the following 29 supplementary Metafont source files:

- `eczi.mf`
- `eczo.mf`
- `eczx.mf`
- `eczz.mf`
- `sans-amsya.mf`
- `sans-amsyb.mf`
- `sans-asymbols.mf`
- `sans-bigdel.mf`
- `sans-bigint.mf`
- `sans-bigop.mf`
- `sans-bsymbols.mf`
- `sans-calu.mf`
- `sans-csc.mf`
- `sans-greekl.mf`
- `sans-greeku.mf`
- `sans-IPiXi.mf`
- `sans-IPiXicsc.mf`
- `sans-mathex.mf`
- `sans-mathint.mf`
- `sans-mathsl.mf`
- `sans-mathsy.mf`
- `sans-roman.mf`
- `sans-romanu.mf`
- `sans-romms.mf`
- `sans-slantms.mf`
- `sans-sym.mf`
- `sans-symbol.mf`
- `sans-xbbold.mf`
- `sansfontbase.mf`

This package should also come with the following 11 LaTeX Font Definition files:

- `omlcmssm.fd`
- `omscmsssy.fd`
- `omxcmssex.fd`
- `ot1cmsmf.fd`
- `ot1xcmss.fd`
- `t1xcmss.fd`
- `ucmsmf.fd`
- `ussesint.fd`
- `ussmsa.fd`
- `ussmsb.fd`
- `uxcmss.fd`

Finally, it should come with the font map file, LaTeX package, and documentation:

- `sansmathfonts.map`
- `sansmathfonts.sty`
- `sansmathfonts.tex`
- `sansmathfonts.pdf`

4. License

This work (the sansmathfonts package) consists of the files listed in Section 3.

This work may be distributed and/or modified under the conditions of the LaTeX Project Public License, either version 1.3c of this license or (at your option) any later version.

The latest version of the license is in

`http://www.latex-project.org/lppl.txt`

and version 1.3 or later is part of all distributions of LaTeX version 2003/06/01 or later.

This work has the LPPL maintenance status "maintained".

Almost all of the Metafont files in this package are very closely based on existing files in the 2011 TeX Live distribution; see comments near the start of the individual files for notes on their sources. Also, note that the files

- `cmssxi8.pfb`, `cmssxi8-cmsmfcopy.tfm`
- `cmssxi9.pfb`, `cmssxi9-cmsmfcopy.tfm`
- `cmssxi10.pfb`, `cmssxi10-cmsmfcopy.tfm`
- `cmssxi12.pfb`, `cmssxi12-cmsmfcopy.tfm`
- `cmssxi17.pfb`, `cmssxi17-cmsmfcopy.tfm`
- `cmssbx8.pfb`, `cmssbx8-cmsmfcopy.tfm`
- `cmssbx9.pfb`, `cmssbx9-cmsmfcopy.tfm`
- `cmssbx12.pfb`, `cmssbx12-cmsmfcopy.tfm`
- `cmssbx17.pfb`, `cmssbx17-cmsmfcopy.tfm`

were derived from unedited MetaFont source files in the sauter package using mktextfm, mftrace 1.2.18 and Fontforge.

5. Revision history

- April 2013: Original upload
- February 2017: Corrected the font names in `sansmathfonts.map`; this allowed the package to be used correctly with dvips.
- April 2019: Fixed a bug in the file `ucmsmf.fd` that prevented the `[I]` package option from working correctly; rewrote most of the `.fd` files to allow fonts to be loaded at arbitrary sizes; changed maintenance status from "author-maintained" to "maintained".
- June 2019: Rewrote the file `omxcmssex.fd` to allow the math extended characters to be loaded at arbitrary sizes.
- June 2021: Rewrote the OT1, T1, and U font definition files to substitute bold-extended fonts for bold fonts as necessary. Added some package errors and warnings if the document font encoding is not supported.
- October 2022: Bug fix to allow compatibility with LuaLaTeX and XeLaTeX.

- November 2023: Corrected the spacing of the lowercase I in the caps and small caps fonts used with the `[I]` package option.
- October 2024:

  Added the `[letters]` and `[AMS]` options.

  Fixed a bug in the cmsmf fonts; in previous versions, when LaTeX asked for bold non-extended fonts, it would substitute xcmss bold-extended fonts rather than cmsmf bold-extended fonts.

  Added two lines in `sansmathfonts.sty` to allow LaTeX to use `ts1cmss.fd` for TS1 symbols. This is what in modern LaTeX *actually* allows for a correct text mode `\pounds` symbol: `\pounds` £ `\textsf{\pounds}` **£**. (A bug remains in that `$\pounds$` produces *$* rather than **£** in math mode; as a workaround, try `$\text{\textsf{\pounds}}$`.)

  Certain `.tfm` files are supplied with TeX Live as part of the sauter package; I have added copies of these `.tfm` files to make the cmsmf font family (the `[I]` package option) work even if the sauter package is not installed.