

Garamond-Math, Ver. 2019-02-05

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1 Introduction

Garamond-Math is an open type math font matching the *EB Garamond (Octavio Pardo)*¹ and *EB Garamond (Georg Mayr-Duffner)*². Many mathematical symbols are derived from other fonts, others are made from scratch. The metric is generated with a python script.

The font is best used with X_YTeX, with other engine, one might end up getting very bad spacing.

This font is still under development, do not expect the font to be free of bugs. We might update any components any at any time. Issues, bug reports, forks and other contributions are welcome. Please visit GitHub (<https://github.com/YuanshengZhao/Garamond-Math/>) for development details.

The minimal example with unicode-math package is as following:

```
%Compile with `xelatex' command
\documentclass{article}
\usepackage[math-style=ISO, bold-style=ISO]{unicode-math}
\setmainfont{EB Garamond}%You should have installed the font
\setmathfont{Garamond-Math.otf}[StylisticSet={7,9}]%Use StylisticSet that you like
\begin{document}
  \[x^3+y^3=z^3\]
\end{document}
```

2 Alphabets & StylisticSet

The text font in this document is set to Libertinus Sans deliberately so that the difference between text and math can be easily seen.

Latin and Greek (StylisticSet 4/5 give semi/extra bold for `\sympbf`)

Each letter is regarded as variable, so the spacing is larger than usual text. I recommend typing equations like this (pay attention to `\sympup` e, i, and text cos, d): $e^{ikz} = \cos kz - i \int_0^{kz} \cos \zeta d\zeta$.

ABCDEFGHIJKLMN OPQRSTUVWXYZ

abcdefghijklmnopqrstu vwxyz

ABCDEFGHIJKLMN OPQRSTUVWXYZ

abcdefghijklmnopqrstu vwxyz

ABCDEFGHIJKLMN OPQRSTUVWXYZ

abcdefghijklmnopqrstu vwxyz

ABCDEFGHIJKLMN OPQRSTUVWXYZ

abcdefghijklmnopqrstu vwxyz

ΑΒΓΔΕΖΗΘΙΚΛΜΝΞΟΠΡΣΤΥΦΧΨΩ

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¹<https://ctan.org/pkg/ebgaramond/>, and <https://github.com/octaviopardo/EBGaramond12/>

²<https://github.com/georgd/EB-Garamond/>

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abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Sans and Typewriter: From Libertinus Math³

ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Blackboard (StylisticSet 1 gives rounded XITS Math⁴)

ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Script: Rounded XITS Math [StylisticSet 3 gives scaled CM; 8 gives Garamond-compatible ones (experimental)]

ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
ΑΒCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

³<https://github.com/khaledhosny/libertinus/>

⁴<https://github.com/khaledhosny/xits/>

Digits: Same width between weight and serif/sans

3.141592653589793238462643383279502884197169399375105820974944592307816406286

3.141592653589793238462643383279502884197169399375105820974944592307816406286

3.141592653589793238462643383279502884197169399375105820974944592307816406286

\partial: (StylisticSet 2 gives curved ones)

$$\partial_{\mu}(\partial^{\mu}\phi) - \varepsilon^{\lambda\mu\nu}\partial_{\mu}(A_{\lambda}\partial_{\nu}f)$$

$$\partial_{\mu}(\partial^{\mu}\phi) - \varepsilon^{\lambda\mu\nu}\partial_{\mu}(A_{\lambda}\partial_{\nu}f)$$

\hbar: (StylisticSet 6 gives horizontal bars)

\hbar \hbar

Italic \hbar : (StylisticSet 10 gives out-bending ones)

$$\hbar = \frac{\mathbf{h}}{2\pi} \quad \hbar = \frac{\mathbf{h}}{2\pi}$$

\tilde: (StylisticSet 9 gives “normal” ones)

\tilde{F} \tilde{F}

\int: (StylisticSet 7 gives a variant with inversion symmetry)

$$\oint_{\partial\Sigma} \vec{E} \cdot d\vec{l} = -\frac{1}{c} \frac{d}{dt} \iint_{\Sigma} \vec{B} \cdot d\vec{S}$$

$$\oint_{\partial\Sigma} \vec{E} \cdot d\vec{l} = -\frac{1}{c} \frac{d}{dt} \iint_{\Sigma} \vec{B} \cdot d\vec{S}$$

3 Known Issue

- As mentioned before, the font should only be used with X₃TeX.
- Various spacing problems. Though math fonts technically should not be kerned, some pairs looks very ugly (Ex. VA); sometimes sub/superscript may also have same problem.
- Fake optical size. EB Garamond does not contain a complete set of glyphs (normal + bold + optical size of both weights). The “optical size ssty” is made by interpolating different weights at the present (without this, the double script is too thin to be readable).

4 Equation Samples

$$1 + 2 - 3 \times 4 \div 5 \pm 6 \mp 7 + 8 = -a \oplus b \otimes c - \{z\}$$

$$\forall \varepsilon, \exists \delta : x \in A \cup B \subset S \cap T \not\subseteq U$$

$$R_{\nu\kappa\lambda}^{\mu} = \partial_{\kappa} \Gamma_{\lambda\nu}^{\mu} - \partial_{\lambda} \Gamma_{\kappa\nu}^{\mu} + \Gamma_{\kappa\sigma}^{\mu} \Gamma_{\lambda\nu}^{\sigma} - \Gamma_{\lambda\sigma}^{\mu} \Gamma_{\kappa\nu}^{\sigma}$$

$$T_{\alpha_1 \dots \alpha_k}^{\beta_1 \dots \beta_l} = T_{i_1 \dots i_k}^{j_1 \dots j_l} \frac{\partial x^{i_1}}{\partial x^{\alpha_1}} \dots \frac{\partial x^{i_k}}{\partial x^{\alpha_k}} \frac{\partial x^{j_1}}{\partial x^{\beta_1}} \dots \frac{\partial x^{j_l}}{\partial x^{\beta_l}}$$

$$\int_{\sqrt{\frac{1-mu+md/k^2}{2mu/k}}}^{X_p} \overbrace{1+2+3+4+5+6+7+8}$$

$$x \leftarrow y \leftrightarrow w \Rightarrow b \Leftrightarrow c \Uparrow y \Downarrow w \Downarrow b \Downarrow c \searrow p \not\ll px \leftarrow x \uparrow X \Leftarrow Y \mapsto Z \uparrow f \Leftrightarrow f \Downarrow fb \Leftrightarrow b \Leftrightarrow b$$

$$\int_0^1 \frac{\ln(x+1)}{x} dx = \int_0^1 \sum_{i=1}^{\infty} \frac{(-x)^{i-1}}{i} dx = \sum_{i=1}^{\infty} \int_0^1 \frac{(-x)^{i-1}}{i} dx = \sum_{i=1}^{\infty} \frac{(-1)^{i+1}}{i^2} = \frac{\pi^2}{12}$$

