

Notomath—LaTeX math support for the noto package

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This package provides math support for the Google font collection Noto, a massive text font whose \LaTeX support has been available for several years using Bob Tennent's `noto` package. The math support is based on `newtxmath` but there are some wrinkles that make it desirable to craft a small package, `notomath`, that can serve as a front end to simplify the business of lining up the text and math options, given that there are considerable size discrepancies between text and math at their natural sizes.

For the `noto` option to `newtxmath`, the Roman and Greek alphabets in the latter were substituted by those in Noto scaled down by 10% to an x-height of 482, which is a close enough match to the symbols in `newtxmath` for all practical purposes.

The Noto fonts comprise three different faces: `NotoSerif`, `NotoSans` and `NotoSansMono`. Each face has its own `.sty` file: `noto-serif.sty`, `noto-sans.sty` and `noto-mono.sty`. There is also an integrated `.sty` file, `noto.sty`, though it is a bit less configurable. Most of the time, it should not be necessary to load any of these packages explicitly, that task being relegated to the package `notomath`.

Usage

For most users, it will likely suffice to place some small variant of the following line in the preamble:

```
\usepackage{notomath}
```

The effect of this is:

- load `noto-serif` and `noto-sans` scaled down by the factor `.9` to an x-height of 482;
- set the main text font to `NotoSerif` and set `\sfdefault` to `NotoSans`;
- the only weight used from the nine available weights are `regular` and `bold`, as these are the weights used in `newtxmath` with options `noto` and `notosans`;
- load `newtxmath` with option `noto` at natural scale.

Alternatively, the package may be loaded with options that modify the above behaviors:

- `mono` loads, in addition, `noto-mono` at the same x-height as the other Noto text packages.
- `scale` (or `scaled`) allows you to rescale all the Noto text packages and `newtxmath` by the specified factor.
- the figure style for `NotoSerif` and `NotoSans` may be controlled by the options `proportional` (or `pf`) and `oldstyle` (or `osf`), as in the `noto` package. (The default setting is `tabular`, lining figures.)
- You may add as an option to `notomath` any `newtxmath` option that is relevant to `noto`—these are simply passed along to `newtxmath`, if truly relevant. (E.g., option `vvarbb` would be passed along, but not `garamondx` because that would change all the math italic alphabets to match `garamondx`.)
- `sfdefault` changes the main text font to `NotoSans`, but leaves the meaning of `\rmdefault` unchanged, so that `\text{rm}` prints its argument using `NotoSerif`.

Usage Notes

- There are a couple of issues that might lead you to avoid NotoSansMono as your Typewriter font:
 - In OT1 encoding, the glyphs are not laid out as `TEX TYPEWRITER TEXT`, as, for example, `cmtt`. This means you will get incorrect output from text that involves quotes, backslash, braces and the like. (This is not a problem in other encodings such as T1.)
 - The NotoSansMono fonts have no `visible-space` glyph, so `\verb*` will fail to render the space as something like `␣`. If this is important to you, replace `noto-mono` with a package like `inconsolata`, if you want to try another sans mono font. The loading order is important—you should load `inconsolata` before loading `notomath`.
- If you chose the `sfdefault` option so that NotoSans is the main text font, you may find that a SansMono font is too similar to be easily distinguished from the main font, in which case you may wish to switch to a serifed mono font. If not loading NotoSansMono by means of the option `mono`, you should load a replacement TT package BEFORE loading `notomath` if you wish to be able to use the macro `\mathtt` using glyphs that match those used for `\texttt`. There are three reasonable options, and possibly more that I'm not aware of. Each would need to be scaled up a bit.
 - The TT package `zlm` does have a `visible-space` glyph and its OT1 encoding is in `TEX TYPEWRITER TEXT` so `\verb` and `\texttt` function correctly even in OT1 encoding. I find the caps too tall to be a very good match.
 - The TT package `newtxtt` does have a `visible-space` glyph and works well in T1 encoding. There is no OT1 encoded version currently. Caps are a bit too tall to be a very good match.
 - The TT package `nimbusmononarrow` does have a `visible-space` glyph and its OT1 encoding is in `TEX TYPEWRITER TEXT` so `\verb` and `\texttt` function correctly even in OT1 encoding. Caps are not too tall—this is my preferred serifed TT with NotoSans text.

Example preamble fragments

EXAMPLE 1:

```
\usepackage[mono,vvarbb,upint]{notomath}
% load NotoSerif, NotoSans, NotoSansMono, mainfont=NotoSerif
% options vvarbb and upint passed to newtxmath, resulting in
% STIX Blackboard Bold and upright integrals rather than slanted
```

The Noto fonts will be scaled to x-height 482, matching math symbols. The main text font will be NotoSerif.

EXAMPLE 2:

```
\usepackage[varq,varl]{inconsolata} % inconsolata sans mono
\usepackage[vvarbb,uprightscript]{notomath}
% load NotoSerif, NotoSans, mainfont=NotoSerif
% options vvarbb and uprightscript passed to newtxmath, resulting in
% STIX Blackboard Bold and upright script
```

The Noto fonts will be scaled to x-height 482, matching math symbols. The main text font will be NotoSerif.

EXAMPLE 3:

```
\usepackage[scaled=1.12]{nimbusmononarrow}% typewriter font
\usepackage[sfdefault,subscriptcorrection]{notomath}
% load NotoSerif, NotoSans, mainfont=NotoSans
% option subscriptcorrection passed to newtxmath
```

will output the Noto fonts scaled to x-height 482 with matching math symbols. The main text font will be NotoSans.

EXAMPLE 4:

```
\usepackage[scaled=1.24]{nimbusmononarrow}% typewriter font
\usepackage[scale=1.11,sfdefault,pf,osf]{notomath}
% load NotoSerif, NotoSans, mainfont=NotoSans
% option subscriptcorrection passed to newtxmath
```

will output the Noto fonts scaled to x-height 536 with matching math symbols. The main text font will be NotoSans with proportional oldstyle figures except in math, which always uses tabular lining figures.

The examples above all work with `pdflatex`, and with `xelatex` if some additional rules are followed. With `xelatex`, the lines in the above examples must precede the loading of `fontspec`, which must use the option `nomath`. After that, one may load any text fonts required for secondary use, or even replace the main Noto fonts.

Subscript Correction

The spacing of math letters was adjusted so the superscripts would not collide with the base letters. This was necessary mainly for letters like j , f , y and β as superscripts and like D and Ω as base letters. As a result of these adjustments, some of the formerly problematic superscript letters become problematic subscript letters. Two files are provided to make adjustments to the letter by inserting appropriate kerns when that letter is the first character in a subscript—one for NotoSerif and one for NotoSans letters, under the respective names

```
newtx-noto-subs.tex % for NotoSerif
newtx-notosans-subs.tex
```

The appropriate file is read in by `newtxmath` provided you add the option `subscriptcorrection`. A line in the file of the form `{j}{-2}` will translate to a kern of -2μ being placed before a leading j in a subscript.

Lower level settings

It may be that you wish to make use of lower level settings in the individual `noto-` packages. In that case, the following information may be useful.

Recall from the README to the `noto` package:

- `\usepackage{noto}`
 - loads NotoSerif as `\rmdefault`;
 - loads NotoSans as `\sfdefault`;
 - loads NotoSansMono as `\ttdefault`;
 - lets `\familydefault` to `\rmdefault`;
 - so, main body text is NotoSerif, `\textsf` points to NotoSans and `\texttt` to NotoSansMono.
 - The `scale` option does not affect NotoSerif size.
- `\usepackage{noto-serif}`
 - loads NotoSerif as `\rmdefault`;
 - lets `\familydefault` to `\rmdefault`;
 - neither NotoSans nor NotoSansMono is loaded.
 - `scale` option available.

- `\usepackage{noto-sans}`
 - loads NotoSans as `\sfdefault`;
 - does not modify `\familydefault`;
 - neither NotoSerif or NotoSansMono is loaded.
 - scale option available.
- `\usepackage[sfdefault]{noto-sans}`
 - loads NotoSans as `\sfdefault`;
 - lets `\familydefault` to `\sfdefault`
 - neither NotoSerif or NotoSansMono is loaded and NotoSans becomes the main text font.
 - scale option available.
- `\usepackage{noto-mono}`
 - loads NotoSansMono as `\ttdefault`;
 - neither NotoSerif or NotoSans is loaded.
 - scale option available.

At its lowest level, you invoke NotoMath in `newtxmath` using the option `noto`, and NotoSansMath using the option `notosans`.

Math samples

An inversion formula: Let $g : \mathbb{R}^+ \rightarrow \mathbb{R}$ be bounded and right continuous, and let $\varphi(\alpha) := \int_0^\infty e^{-\alpha t} g(t) dt$ denote its Laplace transform. Then, for every $t > 0$,

$$g(t) = \lim_{\varepsilon \rightarrow 0} \lim_{\lambda \rightarrow \infty} \varepsilon^{-1} \sum_{\lambda t < k \leq (\lambda + \varepsilon)t} \frac{(-1)^k}{k!} \lambda^k \varphi^{(k)}(\lambda). \quad (1)$$

Solutions of systems of ODEs: Let $\mathbf{v}(\mathbf{x}, \boldsymbol{\alpha})$ denote a parametrized vector field ($\mathbf{x} \in U$, $\boldsymbol{\alpha} \in A$) where U is a domain in \mathbb{R}^n and the parameter space A is a domain in \mathbb{R}^m . We assume that \mathbf{v} is C^k -differentiable as a function of $(\mathbf{x}, \boldsymbol{\alpha})$, where $k \geq 2$. Consider a system of differential equations in U :

$$\mathbf{x} = \mathbf{v}(\mathbf{x}, \boldsymbol{\alpha}), \quad \mathbf{x} \in U \quad (2)$$

Fix an initial point \mathbf{p}_0 in the interior of U , and assume $\mathbf{v}(\mathbf{p}_0, \boldsymbol{\alpha}_0) \neq \mathbf{0}$. Then, for sufficiently small t , $|\mathbf{p} - \mathbf{p}_0|$ and $|\boldsymbol{\alpha} - \boldsymbol{\alpha}_0|$, the system (2) has a unique solution $\mathbf{x}_\alpha(t)$ satisfying the initial condition $\mathbf{x}_\alpha(0) = \mathbf{p}$, and that solution depends differentiably (of class C^k) on t , \mathbf{p} and $\boldsymbol{\alpha}$.

Stirling's formula:

$$\Gamma(z) \sim e^{-z} z^{z-1/2} \sqrt{2\pi} \left[1 + \frac{1}{12z} + \frac{1}{288z^2} - \frac{139}{51840z^3} + \dots \right], \quad z \rightarrow \infty \text{ in } |\arg z| < \pi. \quad (3)$$

Bézier curves: Given z_1, z_2, z_3, z_4 in \mathbb{C} , define the Bézier curve with control points z_1, z_2, z_3, z_4 by

$$z(t) := (1-t)^3 z_1 + 3(1-t)^2 t z_2 + 3(1-t)t^2 z_3 + t^3 z_4, \quad 0 \leq t \leq 1.$$

Because $(1-t)^3 + 3(1-t)^2 t + 3(1-t)t^2 + t^3 = (1-t+t)^3 = 1$ and all summands are positive for $0 \leq t \leq 1$, $z(t)$ is a convex combination of the four points z_k , hence the curve defined by $z(t)$ lies in their convex hull. As t varies from 0 to 1, the curve moves from z_1 to z_4 with initial direction $z_2 - z_1$ and final direction $z_4 - z_3$.

Maxwell's equations:

$$\begin{aligned}\mathbf{B}' &= -c\nabla \times \mathbf{E} \\ \mathbf{E}' &= c\nabla \times \mathbf{B} - 4\pi\mathbf{J}.\end{aligned}$$

Residue theorem: Let f be analytic in the region G except for the isolated singularities a_1, a_2, \dots, a_m . If γ is a closed rectifiable curve in G which does not pass through any of the points a_k and if $\gamma \approx 0$ in G , then

$$\frac{1}{2\pi i} \int_{\gamma} f = \sum_{k=1}^m n(\gamma; a_k) \operatorname{Res}(f; a_k).$$

Maximum modulus principle: Let G be a bounded open set in \mathbb{C} and suppose that f is a continuous function on \bar{G} which is analytic in G . Then

$$\max\{|f(z)| : z \in \bar{G}\} = \max\{|f(z)| : z \in \partial G\}.$$

Jacobi's identity: Define the *theta function* ϑ by

$$\vartheta(t) = \sum_{n=-\infty}^{\infty} \exp(-\pi n^2 t), \quad t > 0.$$

Then

$$\vartheta(t) = t^{-1/2} \vartheta(1/t).$$

The following three samples show the previous three reworked using NotoSerif and its associated math fonts.

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Font Tables

SANS MATH LETTERS

	0	1	2	3	4	5	6	7	
00x	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
01x	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
02x	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
03x	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
04x	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	ϖ_{36}	ϱ_{37}	ς_{38}	φ_{39}	"2x
05x	\leftarrow_{40}	\longleftarrow_{41}	\rightarrow_{42}	\longrightarrow_{43}	\curvearrowright_{44}	\curvearrowleft_{45}	\blacktriangleright_{46}	\blacktriangleleft_{47}	
06x	0 ₄₈	1 ₄₉	2 ₅₀	3 ₅₁	4 ₅₂	5 ₅₃	6 ₅₄	7 ₅₅	"3x
07x	8 ₅₆	9 ₅₇	. ₅₈	, ₅₉	< ₆₀	/ ₆₁	> ₆₂	★ ₆₃	
10x	∂_{64}	A_{65}	B_{66}	C_{67}	D_{68}	E_{69}	F_{70}	G_{71}	"4x
11x	H_{72}	I_{73}	J_{74}	K_{75}	L_{76}	M_{77}	N_{78}	O_{79}	
12x	P_{80}	Q_{81}	R_{82}	S_{83}	T_{84}	U_{85}	V_{86}	W_{87}	"5x
13x	X_{88}	Y_{89}	Z_{90}	b_{91}	h_{92}	$\#_{93}$	\smile_{94}	\frown_{95}	
14x	ℓ_{96}	a_{97}	b_{98}	c_{99}	d_{100}	e_{101}	f_{102}	g_{103}	"6x
15x	h_{104}	i_{105}	j_{106}	k_{107}	l_{108}	m_{109}	n_{110}	o_{111}	
16x	p_{112}	q_{113}	r_{114}	s_{115}	t_{116}	u_{117}	v_{118}	w_{119}	"7x
17x	x_{120}	y_{121}	z_{122}	l_{123}	j_{124}	\varnothing_{125}	$\vec{}_{126}$	$\hat{}_{127}$	
20x	1 ₂₈	κ_{129}	1 ₃₀	1 ₃₁	0 ₁₃₂	1 ₁₃₃	2 ₁₃₄	3 ₁₃₅	"8x
21x	4 ₁₃₆	5 ₁₃₇	6 ₁₃₈	7 ₁₃₉	8 ₁₄₀	9 ₁₄₁	\mathcal{A}_{142}	\mathcal{B}_{143}	
22x	\mathcal{C}_{144}	\mathcal{D}_{145}	\mathcal{E}_{146}	\mathcal{F}_{147}	\mathcal{G}_{148}	\mathcal{H}_{149}	\mathcal{I}_{150}	\mathcal{J}_{151}	"9x
23x	\mathcal{K}_{152}	\mathcal{L}_{153}	\mathcal{M}_{154}	\mathcal{N}_{155}	\mathcal{O}_{156}	\mathcal{P}_{157}	\mathcal{Q}_{158}	\mathcal{R}_{159}	
24x	\mathcal{S}_{160}	\mathcal{T}_{161}	\mathcal{U}_{162}	\mathcal{V}_{163}	\mathcal{W}_{164}	\mathcal{X}_{165}	\mathcal{Y}_{166}	\mathcal{Z}_{167}	"Ax
25x	a_{168}	b_{169}	c_{170}	d_{171}	e_{172}	f_{173}	g_{174}	h_{175}	
26x	i_{176}	j_{177}	k_{178}	l_{179}	m_{180}	n_{181}	o_{182}	p_{183}	"Bx
27x	q_{184}	r_{185}	s_{186}	t_{187}	u_{188}	v_{189}	w_{190}	x_{191}	
30x	y_{192}	x_{193}	z_{194}	\mathcal{Z}_{195}	\mathcal{A}_{196}	\mathcal{B}_{197}	\mathcal{C}_{198}	\mathcal{D}_{199}	"Cx
31x	\mathcal{E}_{200}	\mathcal{F}_{201}	\mathcal{G}_{202}	\mathcal{H}_{203}	\mathcal{I}_{204}	\mathcal{J}_{205}	\mathcal{K}_{206}	\mathcal{L}_{207}	
32x	\mathcal{M}_{208}	\mathcal{N}_{209}	\mathcal{O}_{210}	\mathcal{P}_{211}	\mathcal{Q}_{212}	\mathcal{R}_{213}	\mathcal{S}_{214}	\mathcal{T}_{215}	"Dx
33x	\mathcal{U}_{216}	\mathcal{V}_{217}	\mathcal{W}_{218}	\mathcal{X}_{219}	\mathcal{Y}_{220}	\mathcal{Z}_{221}	a_{222}	b_{223}	
34x	c_{224}	d_{225}	e_{226}	f_{227}	g_{228}	h_{229}	i_{230}	j_{231}	"Ex
35x	k_{232}	l_{233}	m_{234}	n_{235}	o_{236}	p_{237}	q_{238}	r_{239}	
36x	s_{240}	t_{241}	u_{242}	v_{243}	w_{244}	x_{245}	y_{246}	z_{247}	"Fx
37x	1 ₂₄₈	2 ₂₄₉	2 ₅₀	2 ₅₁	2 ₅₂	2 ₅₃	2 ₅₄	2 ₅₅	
	"8	"9	"A	"B	"C	"D	"E	"F	

SANS MATH LETTERSA

	0	1	2	3	4	5	6	7	
00x	Γ ₀	Δ ₁	Θ ₂	Λ ₃	Ξ ₄	Π ₅	Σ ₆	Υ ₇	"0x
01x	Φ ₈	Ψ ₉	Ω ₁₀	α ₁₁	β ₁₂	γ ₁₃	δ ₁₄	ε ₁₅	
02x	ζ ₁₆	η ₁₇	θ ₁₈	ι ₁₉	κ ₂₀	λ ₂₁	μ ₂₂	ν ₂₃	"1x
03x	ξ ₂₄	π ₂₅	ρ ₂₆	σ ₂₇	τ ₂₈	υ ₂₉	φ ₃₀	χ ₃₁	
04x	ψ ₃₂	ω ₃₃	ε ₃₄	ϑ ₃₅	ω ₃₆	ρ ₃₇	ς ₃₈	φ ₃₉	"2x
05x	40	41	42	0 ₄₃	1 ₄₄	2 ₄₅	3 ₄₆	4 ₄₇	
06x	5 ₄₈	6 ₄₉	7 ₅₀	8 ₅₁	9 ₅₂	53	Ϸ ₅₄	ϸ ₅₅	"3x
07x	Ϸ ₅₆	ϸ ₅₇	:= ₅₈	=: ₅₉	≠ ₆₀	= ₆₁	{ ₆₂	} ₆₃	
10x	Ⓓ ₆₄	Ⓔ ₆₅	Ⓕ ₆₆	Ⓖ ₆₇	Ⓗ ₆₈	Ⓘ ₆₉	Ⓚ ₇₀	Ⓛ ₇₁	"4x
11x	Ⓜ ₇₂	Ⓝ ₇₃	Ⓟ ₇₄	Ⓡ ₇₅	Ⓢ ₇₆	Ⓣ ₇₇	Ⓤ ₇₈	Ⓡ ₇₉	
12x	Ⓟ ₈₀	Ⓡ ₈₁	Ⓢ ₈₂	Ⓣ ₈₃	Ⓤ ₈₄	Ⓡ ₈₅	Ⓢ ₈₆	Ⓣ ₈₇	"5x
13x	Ⓚ ₈₈	Ⓛ ₈₉	Ⓡ ₉₀	Ⓝ ₉₁	Ⓞ ₉₂	Ⓛ ₉₃	Ⓡ ₉₄	Ⓛ ₉₅	
14x	ε ₉₆	a ₉₇	b ₉₈	c ₉₉	d ₁₀₀	e ₁₀₁	f ₁₀₂	g ₁₀₃	"6x
15x	h ₁₀₄	i ₁₀₅	j ₁₀₆	k ₁₀₇	l ₁₀₈	m ₁₀₉	n ₁₁₀	o ₁₁₁	
16x	p ₁₁₂	q ₁₁₃	r ₁₁₄	s ₁₁₅	t ₁₁₆	u ₁₁₇	v ₁₁₈	w ₁₁₉	"7x
17x	x ₁₂₀	y ₁₂₁	z ₁₂₂	t ₁₂₃	l ₁₂₄	l ₁₂₅	j ₁₂₆	1 ₁₂₇	
20x	128	κ ₁₂₉	130	131	A ₁₃₂	B ₁₃₃	C ₁₃₄	D ₁₃₅	"8x
21x	E ₁₃₆	F ₁₃₇	G ₁₃₈	H ₁₃₉	I ₁₄₀	J ₁₄₁	K ₁₄₂	L ₁₄₃	
22x	M ₁₄₄	N ₁₄₅	O ₁₄₆	P ₁₄₇	Q ₁₄₈	R ₁₄₉	S ₁₅₀	T ₁₅₁	"9x
23x	U ₁₅₂	V ₁₅₃	W ₁₅₄	X ₁₅₅	Y ₁₅₆	Z ₁₅₇	a ₁₅₈	b ₁₅₉	
24x	c ₁₆₀	d ₁₆₁	e ₁₆₂	f ₁₆₃	g ₁₆₄	h ₁₆₅	i ₁₆₆	j ₁₆₇	"Ax
25x	k ₁₆₈	l ₁₆₉	m ₁₇₀	n ₁₇₁	o ₁₇₂	p ₁₇₃	q ₁₇₄	r ₁₇₅	
26x	s ₁₇₆	t ₁₇₇	u ₁₇₈	v ₁₇₉	w ₁₈₀	x ₁₈₁	y ₁₈₂	z ₁₈₃	"Bx
27x	1 ₁₈₄	J ₁₈₅	l ₁₈₆	J ₁₈₇	g ₁₈₈	y ₁₈₉	190	191	
30x	192	A ₁₉₃	B ₁₉₄	C ₁₉₅	D ₁₉₆	E ₁₉₇	F ₁₉₈	G ₁₉₉	"Cx
31x	H ₂₀₀	I ₂₀₁	J ₂₀₂	K ₂₀₃	L ₂₀₄	M ₂₀₅	N ₂₀₆	O ₂₀₇	
32x	P ₂₀₈	Q ₂₀₉	R ₂₁₀	S ₂₁₁	T ₂₁₂	U ₂₁₃	V ₂₁₄	W ₂₁₅	"Dx
33x	X ₂₁₆	Y ₂₁₇	Z ₂₁₈	Γ ₂₁₉	Π ₂₂₀	Υ ₂₂₁	π ₂₂₂	223	
34x	224	a ₂₂₅	b ₂₂₆	c ₂₂₇	d ₂₂₈	e ₂₂₉	f ₂₃₀	g ₂₃₁	"Ex
35x	h ₂₃₂	i ₂₃₃	j ₂₃₄	k ₂₃₅	l ₂₃₆	m ₂₃₇	n ₂₃₈	o ₂₃₉	
36x	p ₂₄₀	q ₂₄₁	r ₂₄₂	s ₂₄₃	t ₂₄₄	u ₂₄₅	v ₂₄₆	w ₂₄₇	"Fx
37x	x ₂₄₈	y ₂₄₉	z ₂₅₀	λ ₂₅₁	252	253	254	255	
	"8	"9	"A	"B	"C	"D	"E	"F	

SERIF MATH LETTERS

	0	1	2	3	4	5	6	7	
00x	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
01x	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
02x	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
03x	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
04x	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	ϖ_{36}	ϱ_{37}	ς_{38}	ϕ_{39}	"2x
05x	\leftarrow_{40}	\longleftarrow_{41}	\rightarrow_{42}	\longrightarrow_{43}	\curvearrowleft_{44}	\curvearrowright_{45}	\blacktriangleright_{46}	\blacktriangleleft_{47}	
06x	0_{48}	1_{49}	2_{50}	3_{51}	4_{52}	5_{53}	6_{54}	7_{55}	"3x
07x	8_{56}	9_{57}	$._{58}$	$._{59}$	$<_{60}$	$/_{61}$	$>_{62}$	\star_{63}	
10x	δ_{64}	A_{65}	B_{66}	C_{67}	D_{68}	E_{69}	F_{70}	G_{71}	"4x
11x	H_{72}	I_{73}	J_{74}	K_{75}	L_{76}	M_{77}	N_{78}	O_{79}	
12x	P_{80}	Q_{81}	R_{82}	S_{83}	T_{84}	U_{85}	V_{86}	W_{87}	"5x
13x	X_{88}	Y_{89}	Z_{90}	b_{91}	\grave{b}_{92}	$\#_{93}$	\smile_{94}	\frown_{95}	
14x	ℓ_{96}	a_{97}	b_{98}	c_{99}	d_{100}	e_{101}	f_{102}	g_{103}	"6x
15x	h_{104}	i_{105}	j_{106}	k_{107}	l_{108}	m_{109}	n_{110}	o_{111}	
16x	p_{112}	q_{113}	r_{114}	s_{115}	t_{116}	u_{117}	v_{118}	w_{119}	"7x
17x	x_{120}	y_{121}	z_{122}	l_{123}	J_{124}	\wp_{125}	\rightarrow_{126}	$\hat{\rightarrow}_{127}$	
20x	1_{28}	κ_{129}	1_{30}	1_{31}	0_{132}	1_{133}	2_{134}	3_{135}	"8x
21x	4_{136}	5_{137}	6_{138}	7_{139}	8_{140}	9_{141}	A_{142}	B_{143}	
22x	\mathcal{E}_{144}	\mathcal{D}_{145}	\mathcal{E}_{146}	\mathcal{F}_{147}	\mathcal{G}_{148}	\mathcal{H}_{149}	\mathcal{I}_{150}	\mathcal{J}_{151}	"9x
23x	\mathcal{K}_{152}	\mathcal{L}_{153}	\mathcal{M}_{154}	\mathcal{N}_{155}	\mathcal{O}_{156}	\mathcal{P}_{157}	\mathcal{Q}_{158}	\mathcal{R}_{159}	
24x	\mathcal{S}_{160}	\mathcal{T}_{161}	\mathcal{U}_{162}	\mathcal{V}_{163}	\mathcal{W}_{164}	\mathcal{X}_{165}	\mathcal{Y}_{166}	\mathcal{Z}_{167}	"Ax
25x	a_{168}	b_{169}	c_{170}	d_{171}	e_{172}	f_{173}	g_{174}	h_{175}	
26x	i_{176}	j_{177}	k_{178}	l_{179}	m_{180}	n_{181}	o_{182}	p_{183}	"Bx
27x	q_{184}	r_{185}	s_{186}	t_{187}	u_{188}	v_{189}	w_{190}	x_{191}	
30x	y_{192}	z_{193}	ι_{194}	\mathcal{L}_{195}	\mathcal{A}_{196}	\mathcal{B}_{197}	\mathcal{C}_{198}	\mathcal{D}_{199}	"Cx
31x	\mathcal{E}_{200}	\mathcal{F}_{201}	\mathcal{G}_{202}	\mathcal{H}_{203}	\mathcal{I}_{204}	\mathcal{J}_{205}	\mathcal{K}_{206}	\mathcal{L}_{207}	
32x	\mathcal{M}_{208}	\mathcal{N}_{209}	\mathcal{O}_{210}	\mathcal{P}_{211}	\mathcal{Q}_{212}	\mathcal{R}_{213}	\mathcal{S}_{214}	\mathcal{T}_{215}	"Dx
33x	\mathcal{U}_{216}	\mathcal{V}_{217}	\mathcal{W}_{218}	\mathcal{X}_{219}	\mathcal{Y}_{220}	\mathcal{Z}_{221}	a_{222}	b_{223}	
34x	c_{224}	d_{225}	e_{226}	f_{227}	g_{228}	h_{229}	i_{230}	j_{231}	"Ex
35x	k_{232}	l_{233}	m_{234}	n_{235}	o_{236}	p_{237}	q_{238}	r_{239}	
36x	δ_{240}	t_{241}	u_{242}	v_{243}	w_{244}	x_{245}	y_{246}	z_{247}	"Fx
37x	1_{248}	j_{249}	2_{50}	2_{51}	2_{52}	2_{53}	2_{54}	2_{55}	
	"8	"9	"A	"B	"C	"D	"E	"F	

SERIF MATH LETTERSA

	0	1	2	3	4	5	6	7	
00x	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
01x	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
02x	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
03x	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
04x	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	ϖ_{36}	ϱ_{37}	ς_{38}	ϕ_{39}	"2x
05x	40	41	42	\mathbb{O}_{43}	$\mathbb{1}_{44}$	$\mathbb{2}_{45}$	$\mathbb{3}_{46}$	$\mathbb{4}_{47}$	
06x	$\mathbb{5}_{48}$	$\mathbb{6}_{49}$	$\mathbb{7}_{50}$	$\mathbb{8}_{51}$	$\mathbb{9}_{52}$	53	\mathbb{C}_{54}	\mathbb{D}_{55}	"3x
07x	\mathbb{E}_{56}	\mathbb{F}_{57}	\mathbb{G}_{58}	\mathbb{H}_{59}	\mathbb{I}_{60}	\mathbb{J}_{61}	\mathbb{K}_{62}	\mathbb{L}_{63}	
10x	\mathbb{d}_{64}	\mathbb{A}_{65}	\mathbb{B}_{66}	\mathbb{C}_{67}	\mathbb{D}_{68}	\mathbb{E}_{69}	\mathbb{F}_{70}	\mathbb{G}_{71}	"4x
11x	\mathbb{H}_{72}	\mathbb{I}_{73}	\mathbb{J}_{74}	\mathbb{K}_{75}	\mathbb{L}_{76}	\mathbb{M}_{77}	\mathbb{N}_{78}	\mathbb{O}_{79}	
12x	\mathbb{P}_{80}	\mathbb{Q}_{81}	\mathbb{R}_{82}	\mathbb{S}_{83}	\mathbb{T}_{84}	\mathbb{U}_{85}	\mathbb{V}_{86}	\mathbb{W}_{87}	"5x
13x	\mathbb{X}_{88}	\mathbb{Y}_{89}	\mathbb{Z}_{90}	\mathbb{h}_{91}	\mathbb{i}_{92}	\mathbb{j}_{93}	\mathbb{z}_{94}	\mathbb{A}_{95}	
14x	\mathbb{E}_{96}	\mathbb{a}_{97}	\mathbb{b}_{98}	\mathbb{c}_{99}	\mathbb{d}_{100}	\mathbb{e}_{101}	\mathbb{f}_{102}	\mathbb{g}_{103}	"6x
15x	\mathbb{h}_{104}	\mathbb{i}_{105}	\mathbb{j}_{106}	\mathbb{k}_{107}	\mathbb{l}_{108}	\mathbb{m}_{109}	\mathbb{n}_{110}	\mathbb{o}_{111}	
16x	\mathbb{p}_{112}	\mathbb{q}_{113}	\mathbb{r}_{114}	\mathbb{s}_{115}	\mathbb{t}_{116}	\mathbb{u}_{117}	\mathbb{v}_{118}	\mathbb{w}_{119}	"7x
17x	\mathbb{x}_{120}	\mathbb{y}_{121}	\mathbb{z}_{122}	$\mathbb{1}_{123}$	\mathbb{I}_{124}	$\mathbb{1}_{125}$	\mathbb{J}_{126}	$\mathbb{1}_{127}$	
20x	128	\mathbb{k}_{129}	130	131	\mathbb{A}_{132}	\mathbb{B}_{133}	\mathbb{C}_{134}	\mathbb{D}_{135}	"8x
21x	\mathbb{E}_{136}	\mathbb{F}_{137}	\mathbb{G}_{138}	\mathbb{H}_{139}	\mathbb{I}_{140}	\mathbb{J}_{141}	\mathbb{K}_{142}	\mathbb{L}_{143}	
22x	\mathbb{M}_{144}	\mathbb{N}_{145}	\mathbb{O}_{146}	\mathbb{P}_{147}	\mathbb{Q}_{148}	\mathbb{R}_{149}	\mathbb{S}_{150}	\mathbb{T}_{151}	"9x
23x	\mathbb{U}_{152}	\mathbb{V}_{153}	\mathbb{W}_{154}	\mathbb{X}_{155}	\mathbb{Y}_{156}	\mathbb{Z}_{157}	\mathbb{a}_{158}	\mathbb{b}_{159}	
24x	\mathbb{c}_{160}	\mathbb{d}_{161}	\mathbb{e}_{162}	\mathbb{f}_{163}	\mathbb{g}_{164}	\mathbb{h}_{165}	\mathbb{i}_{166}	\mathbb{j}_{167}	"Ax
25x	\mathbb{k}_{168}	\mathbb{l}_{169}	\mathbb{m}_{170}	\mathbb{n}_{171}	\mathbb{o}_{172}	\mathbb{p}_{173}	\mathbb{q}_{174}	\mathbb{r}_{175}	
26x	\mathbb{s}_{176}	\mathbb{t}_{177}	\mathbb{u}_{178}	\mathbb{v}_{179}	\mathbb{w}_{180}	\mathbb{x}_{181}	\mathbb{y}_{182}	\mathbb{z}_{183}	"Bx
27x	$\mathbb{1}_{184}$	\mathbb{J}_{185}	$\mathbb{1}_{186}$	\mathbb{J}_{187}	\mathbb{g}_{188}	\mathbb{y}_{189}	190	191	
30x	192	\mathbb{A}_{193}	\mathbb{B}_{194}	\mathbb{C}_{195}	\mathbb{D}_{196}	\mathbb{E}_{197}	\mathbb{F}_{198}	\mathbb{G}_{199}	"Cx
31x	\mathbb{H}_{200}	\mathbb{I}_{201}	\mathbb{J}_{202}	\mathbb{K}_{203}	\mathbb{L}_{204}	\mathbb{M}_{205}	\mathbb{N}_{206}	\mathbb{O}_{207}	
32x	\mathbb{P}_{208}	\mathbb{Q}_{209}	\mathbb{R}_{210}	\mathbb{S}_{211}	\mathbb{T}_{212}	\mathbb{U}_{213}	\mathbb{V}_{214}	\mathbb{W}_{215}	"Dx
33x	\mathbb{X}_{216}	\mathbb{Y}_{217}	\mathbb{Z}_{218}	$\mathbb{1}_{219}$	$\mathbb{1}_{220}$	\mathbb{Y}_{221}	$\mathbb{1}_{222}$	223	
34x	224	\mathbb{a}_{225}	\mathbb{b}_{226}	\mathbb{c}_{227}	\mathbb{d}_{228}	\mathbb{e}_{229}	\mathbb{f}_{230}	\mathbb{g}_{231}	"Ex
35x	\mathbb{h}_{232}	\mathbb{i}_{233}	\mathbb{j}_{234}	\mathbb{k}_{235}	\mathbb{l}_{236}	\mathbb{m}_{237}	\mathbb{n}_{238}	\mathbb{O}_{239}	
36x	\mathbb{p}_{240}	\mathbb{q}_{241}	\mathbb{r}_{242}	\mathbb{S}_{243}	\mathbb{t}_{244}	\mathbb{u}_{245}	\mathbb{v}_{246}	\mathbb{w}_{247}	"Fx
37x	\mathbb{x}_{248}	\mathbb{y}_{249}	\mathbb{Z}_{250}	$\mathbb{1}_{251}$	252	253	254	255	
	"8	"9	"A	"B	"C	"D	"E	"F	