MTPro2 Math

Font guide v1.7

Use the generated font with LuaLaTeX and `unicode-math`:

```
\usepackage{unicode-math}
\setmathfont{MTPro2Math.otf}
```

Use `MTPro2MathLite.otf` for Lite. The examples in this guide use Full. No `mtpro2.sty` is needed. If the font is not installed, give its directory with the `Path` option, as in `[Path=../out/]`. Use LuaTeX's default font processing, not `Renderer=HarfBuzz`. Word is described in Section 10; building the fonts in `mtp2otf.pdf`. The font can also be used with `lua-unicode-math`.

1 Letters and Greek

Ordinary letters are mathematical italic. Use `\symup`, `\symit`, `\symbfup` and `\symbfit` to select a mathematical alphabet explicitly:

`\symup{ABGMXYZabcxyz}`	ABGMXYZabcxyz
`\symit{ABGMXYZabcxyz}`	$ABGMXYZabcxyz$
`\symbfup{ABGMXYZabcxyz}`	$\mathbf{ABGMXYZabcxyz}$
`\symbfit{ABGMXYZabcxyz}`	$\boldsymbol{ABGMXYZabcxyz}$

The `\sym...` commands use the math font rather than the document's text font. Bold italic requires Full. For Greek, the same selectors give $\alpha\beta\Gamma\Omega$, $\mathit{\alpha\beta\Gamma\Omega}$, $\mathbf{\alpha\beta\Gamma\Omega}$ and $\boldsymbol{\alpha\beta\Gamma\Omega}$.

For letters in subscripts, these math-font selectors also retain access to the font's script-positioning data. A text-font selection such as `\mathrm` may use a different font and prevent LuaTeX from using that data. See Section 11 for this and other engine-dependent limits.

Character variants (cv) select local letter or symbol forms; stylistic sets (ss) select related designs across a group of characters. Both can be selected for the whole document. For example, swash z is selected in the preamble:

```
\setmathfont{MTPro2Math.otf}[RawFeature={+cv01}]
```

Default	z	$\boldsymbol{z}$			swash z
`cv01`	$\mathit{cv01}{\cdot}z$	$\boldsymbol{\mathit{cv01}{\cdot}z}$			
Default	$\beta\delta$	$\mathit{\beta\delta}$	$\mathbf{\beta\delta}$	$\boldsymbol{\beta\delta}$	beta, delta
`cv02,cv03`	$\mathit{cv02}{\cdot}\beta\mathit{cv03}{\cdot}\delta$	$\mathit{cv02}{\cdot}\mathit{\beta\delta}$	$\mathbf{cv02}{\cdot}\mathbf{\beta\delta}$	$\boldsymbol{cv02}{\cdot}\boldsymbol{\beta\delta}$	
Default	$\hbar$				Planck sign
`cv04`	$\mathit{cv04}{\cdot}\hbar$				

These choices are available in both editions; their bold counterparts require Full. Under `unicode-math`, `\hbar` and `\hslash` name the same character, whose design is selected by `cv04`.

Beta and delta are independent: `cv02` changes beta, and `cv03` changes delta. The row above enables both. Features can be combined: `RawFeature={+cv01,+cv02}` selects swash z and alternate beta while leaving delta unchanged. For a feature with numbered choices, use, for example, `RawFeature={cv09=2}`. Omit a feature to keep its default design.

2 Script and Fraktur

These alphabets are available in Full. Use `\symscr` and `\symbfscr` for regular and bold Script. `ss01` selects Curly Script. `ss02` changes selected letters in regular and bold Script, including alternatives in the Curly family. `ss03` selects the alternate Curly series directly.

`\symscr{CGILQSYZrz}`

Default	$\mathscr{CGILQSYZ}rz$
`ss01`	$\mathcal{CGILQSYZ}rz$
`ss02`	$\mathscr{CGILQSYZ}rz$
`ss03`	$\mathcal{CGILQSYZ}rz$
`ss01,ss02`	$\mathcal{CGILQSYZ}rz$

```
\setmathfont{MTPro2Math.otf}[RawFeature={+ss01,+ss02}]
```

`ss03` takes precedence over the other regular Script choices. It matches `ss01,ss02` for regular Script, but does not itself enable bold Script alternatives. Curly G/M/N/Q/Y also have alternatives under `ss02`. The Curly selectors affect regular Script; bold Script retains its own design, with its alternatives controlled by `ss02`.

`\symbfscr{CGILQSYZrz}`

Default	$\boldsymbol{\mathscr{CGILQSYZ}rz}$
`ss02`	$\boldsymbol{\mathscr{CGILQSYZ}rz}$

Fraktur is selected with `\symfrak` or `\symbffrak`. Its alternatives use `ss04`, independently of the Script choices.

	`\symfrak{IRYxy}`	`\symbffrak{IRYxy}`
Default	$\mathfrak{IRY}xy$	$\boldsymbol{\mathfrak{IRY}xy}$
`ss04`	$\mathfrak{IRY}xy$	$\boldsymbol{\mathfrak{IRY}xy}$

```
\setmathfont{MTPro2Math.otf}[RawFeature={+ss02,+ss04}]
```

3 Blackboard

Blackboard is available in Full. Use `\symbb{...}` for double-struck letters and digits. The default design and three upright alternatives are shown below.

```
\symbb{ABGMXYZ\;abcxyz\;0123456789}
```

Default	$\mathbb{ABGMXYZ}$ $\mathbb{abcxyz}$ $\mathbb{0123456789}$
`ss05`	$\mathbb{ABGMXYZ}$ $\mathbb{abcxyz}$ $\mathbb{0123456789}$
`ss06`	$\mathbb{ABGMXYZ}$ $\mathbb{abcxyz}$ $\mathbb{0123456789}$
`ss05,ss06`	$\mathbb{ABGMXYZ}$ $\mathbb{abcxyz}$ $\mathbb{0123456789}$

`ss05` selects heavier upright letters. `ss06` selects the Holey Roman family; combine them for its heavier upright design. For example:

```
\setmathfont{MTPro2Math.otf}[RawFeature={+ss05,+ss06}]
```

Four Greek characters and five italic characters have standard Unicode inputs. `ss06` changes these to the corresponding Holey designs; `ss05` leaves them unchanged.

	Greek	Italic
Default	$\mathbb{\Gamma}$ $\mathbb{\Pi}$ $\mathbb{\gamma}$ $\mathbb{\pi}$	$\mathbb{D}$ $\mathbb{d}$ $\mathbb{e}$ $\mathbb{i}$ $\mathbb{j}$
`ss06`	$\mathbb{\Gamma}$ $\mathbb{\Pi}$ $\mathbb{\gamma}$ $\mathbb{\pi}$	$\mathbb{D}$ $\mathbb{d}$ $\mathbb{e}$ $\mathbb{i}$ $\mathbb{j}$

```
\BbbGamma \BbbPi \Bbbgamma \Bbbpi
\mitBbbD \mitBbbd \mitBbbe \mitBbbi \mitBbbj
```

The italic Blackboard selection is limited to these five characters.

4 Operators and formula sizes

To use the math font's upright letters for named operators such as `\sin` and `\cos`, set:

```
\setoperatorfont{\symup}
```

Large operators have ordinary text and display designs. The math style selects them automatically; `\limits` and `\nolimits` control the placement of limits.

$$\textstyle\sum_{k=1}^{n} a_k \quad \int_0^1 f(x)\,dx \qquad \displaystyle\sum_{k=1}^{n} a_k \quad \int_0^1 f(x)\,dx$$

`cv05` changes the three optical designs of `\wedge` and the large operator `\bigwedge` at every supported size:

Default	$p \wedge q$	$\displaystyle\bigwedge_{i=1}^{n} P_i$
`cv05`	$p \mathbin{\&} q$	$\displaystyle\mathop{\&}_{i=1}^{n} P_i$

`ss07` selects slanted sums, products and coproducts at every supported size.

Default	$\displaystyle\sum_{k=1}^{n} a_k$	$\displaystyle\prod_{k=1}^{n} b_k$	$\displaystyle\coprod_{i\in I} X_i$
`ss07`	$\displaystyle\sum_{k=1}^{n} a_k$	$\displaystyle\prod_{k=1}^{n} b_k$	$\displaystyle\coprod_{i\in I} X_i$

```
\setmathfont{MTPro2Math.otf}[RawFeature={+ss07}]
```

Both operator features are available in Full and Lite. The features select design families; the engine's size request selects a stage within a family. Other operators retain their own designs:

$$\bigcap_{i=1}^{n} A_i \qquad \bigcup_{i=1}^{n} A_i \qquad \bigotimes_{i=1}^{n} V_i \qquad \oint_C \vec{F}\cdot d\vec{r}$$

The original package's extra-large operator commands are not provided. Use a size request as described below instead.

Requesting a larger operator

With ordinary `unicode-math` input, a tall fraction after `\int` does not enlarge the integral sign. To select a larger design in LuaLaTeX, set `\Umathoperatorsize` for the required math style:

```
\begingroup
\Umathoperatorsize\displaystyle=3em
\[
  \int_0^1 \frac{1}{1+\frac{x}{1+x^2}}\,dx
\]
\endgroup
```

Ordinary display Requested size `3em`

$$\int_0^1 \frac{1}{1+\frac{x}{1+x^2}}\,dx \qquad \int_0^1 \frac{1}{1+\frac{x}{1+x^2}}\,dx$$

The value is a size request, not a scale factor: the engine chooses from the font's ready-made designs. It does not continuously stretch the glyph. The group limits the setting to this example. Within the group, the setting also applies to other operators in display style, such as `\sum` and `\prod`. Stylistic sets such as `ss07` choose the design family independently of the size request.

Larger designs are available in both Full and Lite. The growing symbols are listed in `mtp2otf.pdf`. The command above is specific to LuaTeX; Word controls operator growth through its own equation settings.

Scripts, fractions and radicals

Subscripts and superscripts select the source's optical sizes automatically:

$$x+\alpha \qquad 2^{x+\alpha} \qquad 2^{2^{x+\alpha}}$$

Radicals and fractions use the ordinary commands:

```
\sqrt{\frac{a^2+b^2}{c^2+d^2}} \qquad \sqrt[3]{x+y}
```

$$\sqrt{\frac{a^2+b^2}{c^2+d^2}} \qquad \sqrt[3]{x+y}$$

5 Parentheses and braces

Use `\left` and `\right` to size delimiters to a formula. The default series uses the original ordinary growth range, followed by an assembly of repeatable parts. The default braces use the morphed design, which approaches the assembled shape as it grows.

`cv07` extends parentheses through the large ready-made designs. The two examples below use the same input and font size.

Default
$$\begin{pmatrix} 2 & -1 & 0 & 0 \\ -1 & 2 & -1 & 0 \\ 0 & -1 & 2 & -1 \\ 0 & 0 & -1 & 2 \end{pmatrix}$$

`cv07`
$$\begin{pmatrix} 2 & -1 & 0 & 0 \\ -1 & 2 & -1 & 0 \\ 0 & -1 & 2 & -1 \\ 0 & 0 & -1 & 2 \end{pmatrix}$$

```
\setmathfont{MTPro2Math.otf}[RawFeature={+cv07}]
```

For braces, `cv06` selects straight braces with the ordinary growth range. `cv08` selects Curly braces with an extended ready-made range.

At larger sizes the default and straight series use the same assembly. Each row shows a small set and a larger piecewise function:

Default $\left\{\frac{1}{n} : n \in \mathbb{N}\right\}$ $\Lambda(x) = \begin{cases} 1+x, & -1 \le x < 0, \\ 1-x, & 0 \le x \le 1, \\ 0, & \text{otherwise.} \end{cases}$

`cv06` $\left\{\frac{1}{n} : n \in \mathbb{N}\right\}$ $\Lambda(x) = \begin{cases} 1+x, & -1 \le x < 0, \\ 1-x, & 0 \le x \le 1, \\ 0, & \text{otherwise.} \end{cases}$

`cv08` $\left\{\frac{1}{n} : n \in \mathbb{N}\right\}$ $\Lambda(x) = \begin{cases} 1+x, & -1 \le x < 0, \\ 1-x, & 0 \le x \le 1, \\ 0, & \text{otherwise.} \end{cases}$

```
\setmathfont{MTPro2Math.otf}[RawFeature={+cv07,+cv08}]
```

Use paired delimiters, or end with `\right.` for a one-sided brace:

```
\left( ... \right)      \left\{ ... \right\}
\left\{ ... \right.
```

The large series continues through very large ready-made sizes before the ordinary assembly. `cv06` takes precedence over `cv08`; choose one brace style. Parenthesis selection remains independent.

6 Accents and horizontal braces

Use a fixed accent for a letter and a wide accent for a group. These constructions are available in both editions.

`\hat{x}, \widehat{ABC}`	$\hat{x}$ $\widehat{ABC}$
`\tilde{x}, \widetilde{ABC}`	$\tilde{x}$ $\widetilde{ABC}$
`\check{x}, \widecheck{ABC}`	$\check{x}$ $\widecheck{ABC}$
`\bar{M}, \wideoverbar{M+N}`	$\bar{M}$ $\overline{M+N}$
`\vec{v}, \overrightarrow{AB}`	$\vec{v}$ $\overrightarrow{AB}$
`\overleftarrow{AB}`	$\overleftarrow{AB}$
`\dot{x}, \ddot{x}, \hat{i}`	$\dot{x}$ $\ddot{x}$ $\hat{i}$

`\bar` and `\overbar` select the fixed accent; `\wideoverbar` selects the stretching accent. `\overline` draws a rule instead. An operator such as $\hat{H}$ uses the ordinary `\hat{H}`.

Horizontal parentheses and braces cover their contents. For example:

```
\overparen{AB} \qquad \underbrace{V\times\cdots\times V}_{n}
```

$$\overparen{AB} \qquad \underbrace{V\times\cdots\times V}_{n}$$

`cv09` selects the design of both overbraces and underbraces:

Default	$\overbrace{a+b+c}^{s}$ $\underbrace{x+y+z}_{t}$
`cv09=1`: plain	$\overbrace{a+b+c}^{s}$ $\underbrace{x+y+z}_{t}$
`cv09=2`: Curly	$\overbrace{a+b+c}^{s}$ $\underbrace{x+y+z}_{t}$

```
\setmathfont{MTPro2Math.otf}[RawFeature={cv09=2}]
```

This choice is independent of the vertical-brace features. Use:

```
\overbrace{...}^{...}      \underbrace{...}_{...}
```

7 Relations

The following Full-edition features change relation designs without changing their input commands or mathematical meanings.

Default	$\subsetneq \supsetneq \subsetneqq \supsetneqq$	
`cv10`	$\subsetneq \supsetneq \subsetneqq \supsetneqq$	`\subsetneq \supsetneq` `\subsetneqq \supsetneqq`
Default	$\lneq \gneq$	
`cv11`	$\lneq \gneq$	`\lneqq \gneqq`

Negated comparisons use `cv12`; negated inclusions use `cv13`. Each independently accepts 0 (off), 1 (first alternative) or 2 (double equality). Value 1 selects slanted equality for comparisons and the AMS alternate for inclusions. Use their direct commands:

```
a\nleq b \quad a\ngeq b \quad A\nsubseteq B \quad A\nsupseteq B
```

Default	$a \nleq b$	$a \ngeq b$	$A \nsubseteq B$	$A \nsupseteq B$
`cv12=1,cv13=1`	$a \nleq b$	$a \ngeq b$	$A \nsubseteq B$	$A \nsupseteq B$
`cv12=2,cv13=2`	$a \nleqq b$	$a \ngeqq b$	$A \nsubseteqq B$	$A \nsupseteqq B$

The not-similar sign is independent:

Default	$a \not\sim b$	`a\nsim b`
`cv14`	$a \nsim b$	

```
\setmathfont{MTPro2Math.otf}[RawFeature={cv12=1,cv13=1,+cv14}]
```

`cv15` selects the proportional-to form; `cv16` selects smile and frown. They can be enabled independently.

Default	$\propto \smile \frown$	
`cv15,cv16`	$\propto \smile \frown$	`\propto \smile \frown`

`ss08` selects shorter relation bars; it does not change the delimiter bars in `\left|x\right|` or `\left\Vert v\right\Vert`. `ss09` selects thicker similarity and approximation signs.

Default	$\mid \nmid \parallel \nparallel$	
`ss08`	$\mid \nmid \parallel \nparallel$	`\mid \nmid \parallel \nparallel`
Default	$\sim \approx$	
`ss09`	$\sim \approx$	`\sim \approx`

8 Other symbols

`cv17` selects the alternative empty-set sign in Full. `\emptyset` and `\varnothing` refer to the same Unicode character under `unicode-math`.

Default	∅	`\emptyset`
`cv17`	∅	
Default	¥ ®	`\mathyen`, U+00AE
`cv18,cv19`	¥ ®	
Default	♠ ♣	`\spadesuit \clubsuit`
`ss10`	♠ ♣	

`cv18` changes yen and `cv19` changes the registered sign in Full; they are independent. `ss10` gives shaded spades and clubs in both editions.

The usual symbol commands include `\ell`, `\partial`, `\nabla`, `\infty`, `\dagger` and `\ddagger`:

$$\ell \quad \partial \quad \nabla \quad \infty \quad \dagger \quad \ddagger$$

Upright Latin letters, including accented letters such as é, come from the Roman font chosen at build time (by default Nimbus Roman). In math, `\symup{é}` selects them. A character without a math command can be entered as `\Umathchar 0 \symoperators "00E9\relax`.

Mathematical sans-serif and monospace alphabets, a complete bold-symbol version, and a compatibility package for MTPro2-specific macros are not included.

9 Combining features

These features can be selected independently. Each example keeps the other symbol at its default unless explicitly enabled.

Default	$\beta + \delta$
`cv02`	$\mathcal{b} + \delta$
`cv03`	$\beta + \partial$

Default	$a \not\leq b \quad a \not\geq b \quad A \subsetneq B \quad A \supsetneq B$
`cv12=1,cv13=2`	$a \not\leqslant b \quad a \not\geqslant b \quad A \subsetneqq B \quad A \supsetneqq B$

Default	$a \propto b \quad x \smile y \quad x \frown y$
`cv15`	$a \propto b \quad x \smile y \quad x \frown y$
`cv16`	$a \propto b \quad x \smile y \quad x \frown y$

Default	¥ ®
`cv18`	¥ ®
`cv19`	¥ Ⓡ

```
\setmathfont{MTPro2Math.otf}[RawFeature={cv12=1,cv13=2}]
```

10 Microsoft Word

Install the TTF and choose it as the equation font, as described in Word's own documentation. Word lists the font as `MTPro2 Math` or `MTPro2 Math Lite`. Do not use the OTF in Word: it declares a much larger clipping area, with which Word fails, for example when saving as PDF.

For the equation text, enable *Kerning for fonts* at 1 pt and above in the Font dialog. Otherwise letters are set without the font's pair kerning. Ordinary mathematical characters include the source italic correction in their advances, so their spacing does not depend on Word adding it between letters.

Use Word's equation editor for alphabets, accents, delimiters and operators. Word does not let you choose character variants or stylistic sets, so equations use the default designs. For this reason the default braces are the morphed design, which grows most smoothly.

11 Differences from MTPro2 with pdfLaTeX

The font follows the Type 1 fonts and `mtpro2.sty` as closely as OpenType MATH allows. These differences remain:

- OpenType MATH has fewer script shifts than TeX. Superscripts in display style, and subscripts without a superscript, are set lower.
- One math axis serves all sizes. In script and scriptscript style, fraction bars and delimiter centers are slightly below the minus and equals signs.
- In script sizes, accents over bases lower than the x-height are set lower. Accents follow the outline of the base rather than its TeX box, so they are higher over letters that extend beyond the box, such as italic A.
- Wide accents grow from the fixed accent, which is used over narrow bases; in scripts they are reduced with the script size.
- Limits of display operators such as `\sum` and `\prod` are closer to the operator.
- Some delimiter sizes differ slightly; `\dbinom` uses a smaller parenthesis.
- LuaTeX does not apply pair kerning in script and scriptscript style. LuaTeX can omit the subscript kern when a subscript starts with a fraction, radical or explicit box, and a narrow subscript can widen the completed formula. An ordinary letter turned into an operator with `\mathop` loses its limit correction.

12 License

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